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ABSTRACT

A study sought to (1) determine the current and potential instructional application of computers in Job Training Partnership Act (JTPA) Titles II, III, and IV programs; and (2) present policy options that would increase the effective use of this technology in employment and training programs. Research methodology involved conducting an assessment of available data, obtaining information from individuals involved in JTPA, and preparing a baseline report. The study found various degrees of use of instructional applications of this technology in the four JTPA programs studied: in Title IIA, computers are used for both instructional management and computer-assisted instruction especially when serviced by large school districts or national service providers; in Title IIB, computer-assisted instruction is used more often than computer-managed instruction; in Title III Dislocated Worker programs, computer-related technology is seldom used; and under Title IV, computers are being used to provide at least some education or occupational training in more than 90 percent of all Job Corps centers. Barriers to effective use of computers in JTPA include lack of information, funding contraints, lack of staff development, lack of software designed for adults, and the school-JTPA relationship. Recommendations were made to create investment funding mechanisms to set up computer equipment and to create a national technology resource center. (More than half of the document contains case studies of five exemplary sites. References and site contacts are included.) (KC)

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The Job Training Partnership Act & Computer-Assisted Instruction

Education TURNKEY Systems, Inc.

Research Report 88-13

August 1988

CE052033

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PREFACE

The National Commission for Employment Policy is charged under Section 473(11) of the Job Training Partnership Act (JTPA) to "study and make recommendations on the use of advanced technology in the management and delivery of services and activities conducted under this Act." As part of this mandate, the National Commission for Employment Policy contracted with Education TURNKEY Systems, Inc. for this initial assessment of the use of computer-assisted instruction and related technology in JTPA employment and training programs.

Part of this research effort involved identifying barriers to the effective use of this technology in JTPA programs and developing policy options and recommendations designed to overcome these barriers. The authors conclude that the major barriers to the effective use of this technology are (1) a lack of information about available computer applications, (2) a lack of training in the skills necessary to operate these systems, and (3), especially in Titles II and III programs, an absence of a funding mechanism which would allow amortization for investments in capital-intensive technology. The authors propose the development of a "national technology resource center" which, among other functions, would act as a clearinghouse for information on this technology and provide a source of training and technical assistance to the JTPA system.

The Commission feels that Education TURNKEY Systems, Inc.'s research has made a useful contribution to our understanding of the issues surrounding the use of this technology in JTPA programs and will assist local, state and Federal policymakers in their deliberations. The author's innovative recommendations certainly merit further discussion; however, the Commission urges that existing sources of information, technical assistance and funding also be examined during the debate.

ACKNOWLEDGEMENTS

This study owes much to many individuals who provided us with information, assistance, cooperation, and insight.

The Expert Panel spent much time deliberating on the topics at hand and provided us with valuable data (the study's mandate did not include any new data collection) and thoughtful insights. To our distinguished Panelists, we owe a debt of gratitude.

Officials at the project's case study sites were extremely hospitable and cooperative in facilitating the field work and reviewing preliminary case study reports. At each of the sites, creative and often persistent individuals played a significant role in the success achieved by their programs through the use of computers.

In addition to the TURNKEY staff, two other individuals played important project roles. Dr. Arnold Packer, a Senior Research Fellow at the Hudson Institute, conducted several of the case studies and, building on his experience as Assistant Secretary of Labor for Policy Development, also took a lead role in developing policy options that could result in more effective use of computers and related technology in the JTPA system. Ms. Lori Strumpf, Director for the Center of Remediation Design, provided a wealth of information based on her extensive work with SDAs and PICs across the country. Ms. Strumpf also contributed to Expert Panel deliberations and conducted field work for one case study site.

We reserve our final note of gratitude for Mr. David Stier of the National Commission for Employment Policy, who helped guide the project from its outset and Mrs. Amy Pozzi Howard, also of the Commission, who contributed greatly to the project's Final Report.

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Executive Summary

Education TURNKEY Systems, Inc. (TURNKEY), under contract to the National Commission for Employment Policy (NCEP), conducted this study of computer use in Job Training Partnership Act (JTPA) Titles II (A and B), III and IV (Job Corps) programs. The project had two principle components: (1) the determination of current and potential instructional application of computers in JTPA, and (2) the presentation of policy options that would increase the effective use of this technology in employment and training programs.

The methodology of the project involved conducting an assessment of available data; obtaining information from individuals who are knowledgeable about current and potential technology use in JTPA; and preparing a base-line report describing the current status of computer use in the various JTPA programs. Assisting in these activities was a distinguished panel of experts drawn from both the public and private sectors. This Expert Panel was convened to review and update base-line information, and then to react to barriers impeding use and options to increase the effective use of this technology in JTPA programs.

This study was not intended to be a quantitative survey of computer use in JTPA. Rather, the study is a qualitative review of some of the ways computers are used effectively in JTPA and the conditions under which such effective use can be expected to occur.

Background: The Basic Skills Crisis

All JTPA programs are designed to assist individuals who are experiencing one or more barriers to employment. Until recently these programs usually concentrated on barriers related to the lack of specific job skills and work experience or to discrimination. However, as the economy started changing under the influences of technology and foreign competition, the nature of available jobs also changed. These new employment opportunities have revealed an alarmingly common new barrier to employment for many JTPA participants: a deficiency in basic reading and math skills. Program experts and researchers are warning that the United States is facing a "basic skills crisis" where substantial numbers of youth and adults are deficient in basic skills in an economy that is demanding proficiency not only in basic skills, but also "higher order" thinking and problem solving skills.

The Job Training Partnership Act has made serious efforts to confront this crisis. In 1986 the Act was amended to encourage the Summer Youth Employment and Training Program (SYETP) funded under Title II-B to assess the reading and math skills of eligible participants and to provide remedial training for those found to be deficient. Two new programmatic goals, increasing services to at-risk individuals, especially youth, and encouraging increased provision of basic skills training, have been adapted by the Title II-A program for Program Year 1988. In addition, beginning in PY 1988, all Title II(A) participants will be assessed for reading skills.

The "basic skills crisis" and these programmatic changes are prompting the employment and training system to provide much more remedial training to adults and youths deficient in basic reading and math skills. In doing so, the system has come to rely on competeny-based instructional programs, finding, as have instructional theory and experience, that a competency-based curriculum is one of the most efficient methods of teaching basic skills. These types of curriculum are particularly adaptable to computer-based instuctional technology.

Current Use of Computers

This paper found various degrees of utilization of instructional applications of this technology in the four JTPA programs studied.

- Computers in Title II(A) are used for both instructional management and computer-assisted instruction and in relatively large configurations or local area networks (LANs),particularly when services are provided by large school districts or national service providers (e.g., OIC, SER, 70,001). In combination with contingency management techniques, several computer-based systems are used effectively in dropout prevention programs, often operated in school environments by community-based or national service providers.

- In Title II(B), computer-assisted instruction is used more extensively than computer-managed instruction with one exception: if a Title II(B) service provider uses computers for instructional management in a Title II(A) program, a similar configuration is often used to deliver the Title II(B) services.

- In the Title III Dislocated Worker program, computer related technology use is limited to providing literacy programs and skill upgrading in only a small number of programs, which often are operated by employers with existing technology-based systems.

- Computers are being used to provide at least some education or occupational training in over 90 percent of all Job Corps centers. Computer use focuses primarily on math, GED preparation, reading/language arts, tool applications (word processing) and general computer literacy.

Barriers To Effective Use

While the use of computers in JTPA has grown remarkably in recent years, there are a number of factors inherent in the complex system which have mitigated against more pervasive use. Chief among these are:

- **Information/Orientation**: Many employment and training professionals are unaware of the potential benefits of using computers in remedial education and other functions. Because of the heterogeneity of the system, vendors who are interested in designing programs and configurations to meet the needs of the Title II(A) and (B) programs reported difficulties finding individuals who could define specific program needs.

- **Funding Constraints**: Both Title II(A) and Title II(B) face the problem of funding equipment purchases (with three to four year average lifetimes) out of operating budgets. Because equipment cannot be amortized, any such investment drives up unit costs for the year in which the purchase is made. Such increased short-term costs often act as a disincentive to investment, even when offsetting long-term benefits are likely. In addition, while there is an increasing emphasis on basic skills remediation in the Title II(B) summer youth programs, there have not been any funds specifically earmarked for equipment purchases. Therefore, many program operators are concerned about trends towards shifting limited resources away from programs to help pay for this technology.

- **Staff Development**: Although the newer computer technology is far easier to use than was equipment only a few years ago, many JTPA staff -- at SDAs and service provider level -- do not have sufficient training to make the most effective use of their computers.

- **Software Designed for Adults**: The lack of computer-aid related technology-based programs designed for adults is a major barrier in itself. Adult programs should be designed to teach basic skills in the context of work to avoid turning off workers who will not admit to deficiencies in reading, for example.

- **School/JTPA Relationship**: In the majority of SDAs remediation and instructional services are provided by educational institutions, most often the local school district. It is, therefore, critical that JTPA program designers and school representatives agree on the goals of the program before the appropriate technology can be applied.

RECOMMENDATIONS

There are two primary recommendations made which would enhance the effective use of this technology in JTPA programs.

- **Create Investment Funding Mechanisms**: The report suggests the creation of a one-time funding approval for a line item for each of the JTPA programs earmarked for service delivery and management technology investments. This mechanism could be similar to the revolving fund concept used in the past by state employment service agencies, whereby investing agencies pay back, over time, funds initially provided by the revolving fund. Such an arrangement could be administered as part of the National Technology Resource Center.

- **Create A National Technology Resource Center**: One of the major drawbacks to effective technology use in JTPA is the lack of a useful base of information on matters relating to technology use. Based upon discussions with the Expert Panel, the establishment of a National Technology Resource Center is recommended. The Center would have three major responsibilities: a) collect and disseminate information; b) facilitate/provide technical assistance; and c) facilitate/support software development.

Among the other policy options set forth are many which encourage more effective communication among all of the participants in the JTPA community -- service providers (including school districts), private industry councils (PICs), state JTPA and Employment Security (ES) officials, the Department of Labor (DOL) and hardware and software vendors.

INTRODUCTION

Education TURNKEY Systems, Inc. (TURNKEY), under contract to the National Commission for Employment Policy (NCEP), conducted this study of computer use in Job Training Partnership Act (JTPA) Titles II (A and B), III and IV (Job Corps) programs. The project had two principle components: (1) the determination of current and potential instructional application of computers in JTPA, and (2) the presentation of policy options that would increase the effective use of this technology in employment and training programs.

The methodology of the project involved conducting an assessment of available data; obtaining information from individuals who are knowledgeable about current and potential technology use in JTPA; and preparing a base-line report describing the current status of computer use in the various JTPA programs. Assisting in these activities was a distinguished panel of experts drawn from both the public and private sectors. This Expert Panel was convened to review and update base-line information, and then to react to barriers impeding use and options to increase the effective use of this technology in JTPA programs.

Used primarily in schools and military training facilities in the past, computer-based instructional delivery systems are being applied rapidly in employment and training programs. This growth has been fueled by a proliferation of educational software and the focusing of the employment and training system on illiteracy and remediation of basic skills.

Insights into the effective use of this technology in JTPA can be developed only with a basic knowledge of the manner in which computer-based technology operates. Chapter One summarizes the important elements of this technology and explains why this type of technology has found a niche in JTPA programs. Chapter Two discusses examples of the instructional applications in Title II (A and B), Title III and Title IV (Job Corps) programs. Chapter Three identifies general and program specific barriers to more effective use of computer technology for the delivery of services. Chapter Four presents options and recommendations designed to address these barriers and increase the effective use of this technology in JTPA programs.

Finally, this paper presents five case studies exhibiting exemplary use of computer-based instructional delivery systems in Austin, Texas; Milwaukee, Wisconsin; the Gary Job Corps Center, Texas; the Phoenix Job Corps Center, Arizona; and the State of South Carolina.

CHAPTER I

Competency-Based Instruction and Microcomputer Technology

Enacted in 1982, the Job Training Partnership Act (JTPA) replaced the Comprehensive Employment and Training Act (CETA) as the primary vehicle for federally funded employment and training programs. There are three primary employment and training programs in JTPA. Title II funds programs designed to assist economically disadvantaged adults and youths (16 to 21 years) in attaining unsubsidized employment or improved employability skills. A sub-section of Title II also funds the Summer Youth Employment and Training Program (SYETP). Title III of the Act funds programs for dislocated workers who have permanently lost their jobs as a result of technological displacement, foreign competition, or structural changes to the economy. The other major employment and training program, funded under Title IV of JTPA, is the Jobs Corps, which provides long-term, intensive service to youth, usually in a residential environment.

All JTPA programs are designed to assist individuals who are experiencing one or more barriers to employment. Until recently these programs usually concentrated on barriers related to the lack of specific job skills and work experience or to discrimination. However, as the economy started changing under the influences of technology and foreign competition, the nature of available jobs also changed. These new employment opportunities have revealed an alarmingly common new barrier to employment for many JTPA participants: a deficiency in basic reading, communication and math skills. Increasingly, program experts and researchers are warning that the United States is facing a "basic skills crisis" where substantial numbers of youth and adults are deficient in basic skills in an economy that is demanding proficiency not only in basic skills, but also "higher order" thinking and problem solving skills. In fact, experts predict that "between now and the year 2000, for the first time in history, a majority of all new jobs will require postsecondary education. Many professions will require nearly a decade of study following high school, and even the least skilled jobs will require a command of reading, computing, and thinking that was once necessary only to the professions." (Johnston and Packer, 1987)

The Job Training Partnership Act has made serious efforts to confront this crisis. In 1986 the Act was amended to encourage the Summer Youth Employment and Training Program (SYETP) funded under Title II-B to assess the reading and math skills of eligible participants and to provide remedial training for those found to be deficient. Two new programmatic goals, increasing services to at-risk individuals, especially youth, and encouraging increased provision of basic skills training, have been adapted by the Title II-A program for program year 1988. In addition, beginning in program year 1988, all Title II(A) participants will be assessed for reading skills.

The "basic skills crisis" and these programmatic changes are prompting the employment and training system to provide much more remedial training to adults and youths deficient in basic reading and math skills. In doing so, the system has come to rely on competency-based instructional programs, which have proven to be an efficient method for teaching basic skills.

Competency-based instruction emphasizes student mastery of specific skills by defining specific objectives and holding the learner accountable to them.(Rodenstein, 1984) Effective competency-based curriculums share these characteristics:

- the learning process should be step-by-step, individualized, and self-paced;
- learning should be based on skill attainment, not on time on task; and should be flexibly scheduled and sequenced;
- frequent feedback on progress and greater accountability for learning efforts and outcomes should direct the learning process; and
- learners should strive for agreed upon goals to enhance a sense of "efficacy." (Taggart, 1988)

There are "natural" parallels between the hallmarks of effective competency-based curriculum and instructional applications of computer technology. For purposes of describing instructional uses of computers, there are two basic types of use:

- computer-assisted instruction (CAI), involving "hands on" computer use by students for the purposes of instruction;and
- computer-managed instruction (CMI), in which the teacher or classroom manager uses the computer for diagnostic, prescriptive and monitoring functions, including record keeping to tracking student's daily accomplishments and problems.

Several characteristics of quality CAI software include: "gaining the student's attention; informing the learner of the objectives of the instructional module; stimulating recall and assessing prior learning; presenting learning stimuli to teach concepts and facts; guiding learning; providing information feedback; assessing and evaluating performance; and enhancing retention and learning transfer". (Rodenstein, 1984) CAI software can be used for drill-and-practice, for problem solving, and for development of higher order, critical thinking skills through such methods as simulation.

Computer-managed instruction allows teachers and other staff to diagnose individual students' learning difficulties, prescribe appropriate learning materials (which may include CAI lessons), monitor participant progress, and generally manage the curriculum process. The hallmarks that form the foundation of CMI are: mastery learning, which divides the curriculum into small units of measurable learning objectives that identify the specific skills the student needs to learn; individualization, which provides the opportunity to learn at an individualized pace; and the teacher and/or student as manager, which allows the analysis of the student's progress and the development of activities to enhance the instruction. (Rodenstein, 1984)

In practice, CAI and CMI can participate independently in an instructional environment. CAI can deliver instruction, while the teacher uses traditional methods for testing, grading, and other classroom management functions. Exclusive CMI programs use the computer for these instructional management purposes while the teacher instructs with traditional "paper and pencil" methods.

When both are present together and integrated with one another, the system is referred to as a "computer-based delivery system". An example of this is when CMI operates on a local area network (LAN) in which one computer (usually a microcomputer with expanded memory capabilities) distributes prescribed CAI lessons to microcomputer work stations where students receive instrucion. Such networked CMI systems are increasingly being used in both schools and JTPA programs, especially in situations in which: (1) the curriculum consists of a large number of competencies to which a wide variety of CAI and other lessons and materials are correlated; and (2) the programs are designed for individualized, self-paced, and often student-directed instruction. The hallmarks of these systems match those that make a competency-based basic skills curriculum effective.

Evidence from dozens of studies of programmed instruction, mastery learning and CAI demonstrate convincingly that using these approaches can increase the skills of disadvantaged students. (Berlin, 1986) A 1985 study of the effectiveness of computer-based instruction, conducted for the National Commission for Employment Policy, found that CAI/CMI reduces student time in mastering objectives and/or results in significant gains in student achievement, particularly with low-achieving students in basic skills areas (TURNKEY, 1985). As reported by several national service providers and Job Corps centers, JTPA participant gains in mathematics of well over one grade equivalent for 25 - 50 hours of instruction are not uncommon.

A number of arguments have also been made by the Office of Technology Assessment (1987) for using computers in bilingual/English as a second language (ESL) instruction; these include:

- the use of CAI can speed up learning rates, a critical factor for limited English proficiency (LEP) students who have more to learn;

- CAI can motivate LEP students, especially where high-interest software exists;
- CAI allows students to "fail" privately without shame;
- the interactive nature of CAI provides LEP students with a sense of control; and
- some CAI programs can complement teachers with limited native language skills, in locales where few language-proficient teachers are available.

Other technologies can enhance these computer-based systems. For example, recent advances in videodisc and related technology can provide new opportunities in the JTPA system. The number of videodisc units used for instructional purposes in public schools has increased from approximately 8,000 units to nearly 15,000 over the last two years. (Instructional Delivery Systems, 1988) Similarly, the number of videodisc education and training programs has increased (from less than 150 to more than 250) in the same period (MECC, 1987). Videodisc use in military and industrial training is considerably more extensive than in the schools.

An interactive videodisc system usually consists of a videodisc player unit, a microcomputer which directs the player unit, and a monitor. Videodisc programs may include hundreds of thousands of still frames or pictures or several hours of motion video. Multiple audio channels provide unique capabilities for overlaying different languages to teach specific skills in ESL programs. Some videodisc programs are designed to be used only with the player (not the computer), providing the user with access to any one frame or video component within less than a second; others are much more comprehensive, using the computer for automated branching and prescribing of materials based on mastery test results. Interactive instructional systems require the student to interact directly with the computer. This interaction allows the CMI functions of the program to vary the pace of instruction; select among different sequences of presentation; test for understanding; and advance accordingly based on the individual needs of the student. (Office of Technology Assessment, 1987)

Within the videodisc (or optical disc) storage family, Compact Disc-Read Only Memory (CD-ROM) can now be interfaced with a microcomputer to allow almost instantaneously access to, for example, any page of a 23-volume encyclopedia (e.g., Grolier's Electronic Encyclopedia). Some CMI network systems use a CD-ROM player to store up to 2,000 software programs which can be distributed to work stations upon the direction of an instructor or selection by the learner. The most prevalent current use of CD-ROM is to access reference materials or other data bases.

The convergence of microcomputers, interactive video technologies and telecommunications has created another configuration, "interactive distance learning," which has grown more rapidly in public schools during the past year than did microcomputers during the early 1980s (Blaschke, 1988). A typical interactive distance learning system consists of (a) a transmitting studio in which a "master" instructor conducts a program for teachers and students in remote locations; (b) a satellite transponder which receives the studio's "uplink" signals and transmits them to a "down link"; (c) a remote receiving station, either an individual school or a cable system; (d) a classroom in which live instruction occurs which is transmitted to a remote classroom which may use microcomputer drill-and-practice; and (e) an audio or data transmission capability from the remote site back to the master instructor to provide immediate feedback on lessons completed.

Interactive distance learning is commonly used to provide students and teachers in remote, isolated locations access to quality programming not otherwise available. In New York state, distance learning is one of the State's high priority delivery systems for programs for at-risk populations. Distance learning programs are being offered by several universities, public television agencies, and a number of private firms (e.g., TI-IN Network).

Another distance learning configuration is the use of instructional television signals to transmit educational courseware to individual schools which have appropriate receiving equipment). Currently being tested in Maryland and New Jersey, such configurations offer potential for reducing the cost of software distribution through the use of existing broadcasting capabilities. Eighteen states and four Canadian provinces are members of the Software Communications Service (SCS), which uses telecommunications to facilitate distribution of video segments of software for preview purposes to public television stations and schools.

NonaNET, operated by the Computer-based Educational Research Lab (CERL) at the University of Illinois, transmits -- via satellite -- 2,000 PLATO lesson plans to individual student work stations where students receive individualized, self-paced CAI. The CERL mainframe computer provides instructional management functions, including diagnosis and prescription, for the remote classrooms.

In addition, many telecomputing systems are used for administrative and related information collection and reporting purposes. Over 40 state departments of education currently have, or are developing, state-wide administrative networks linking the state education agency (SEA) with local education agencies (LEAs). In the JTPA system, a number of similar systems are in used on a limited basis, while others are being developed by service providers to link their state and local affiliates.

These technologies, especially the microcomputer-based delivery systems, are beginning to find their way into JTPA programs. Chapter Two discusses some of these ways these systems are used in Title II (A and B), Title III, and the Job Corps programs.

CHAPTER II

Instructional Applications of Computer Technology in JTPA Programs

This chapter reviews the extent of current instructional utilization of technology in Title II (A and B), Title III and Job Corps programs. There are three general points to make at the outset. First, the use of computer-based technology in education and training is often misunderstood. There is a tendency on the parts of education and training officials to take polarized views of the effects of computers. Some take the viewpoint that computers can never be as effective as instructional staff and, therefore, are not a necessary part of the educational process. Others argue that computers have proven themselves effective means of instruction and should assume the major burden of teaching, with instructors filling a classroom manager function.

In practice, computers are neither a plague nor a panacea. Computers and related technology should be looked upon as one of many tools available to teachers and education/training administrators. They should not be the focus or guiding force behind any curriculum; rather, instructors should deploy computer-assisted instruction when the particular strengths of computers are especially called for (e.g., repetitive drill-and-practice, student-directed branching, self-pacing) by the curriculum.

Secondly, one of the most rapid implementation of this technology is for coupling literacy with occupational training. Although the number of available programs is currently limited, available results appear to be promising and the number of groups developing such programs appears to be increasing. In a number of sites described in this study, creative staff have been able to integrate skills in remedial programs into work programs (e.g., in the Job Corps) or training provided by service providers or facilities operations (e.g., math instruction integrated into the design and construction of a Job Corps dormitory). Adjustable CAI that can be adapted to different situations is most appropriate for coupled literacy training. For example, a basic skills CAI program which allows use of different word lists could be used with youth as well as with older adults and dislocated workers.

Finally, the use of computers and related technology for adults in JTPA Title II and Title III programs is currently not as extensive as in Title II youth programs. Most of the original software in this field was developed for children's use in school environments. Until recently there have been few incentives to develop adult-based instructional software packages. In addition, there is little consensus among the few experts working on software for adults as to what technology approach is most effective with adult populations. Differences in degree and type of motivation, differences in frame of reference and interests, and most adult's general avoidance of school environments dictate CAI applications that are different than those designed for youth.

In contrast with competency-based programs which have proven to be effective with at-risk youth, other alternative approaches appear to be effective with adults. For example, several language experience-based programs build upon and use terminology and functional activities from the work place with which the adult is familiar. These programs can be used in a computer-assisted instruction or interactive videodisc format. Such programs are being developed and demonstrated in several interactive videodisc projects funded by the Department of Labor and operated by various groups, ranging from the United Auto Workers to Domino's Pizza, as mentioned later.

Even within the limited base of existing adult remediation software, there exists very little information on how to use them. For example, within the last two years, only five groups have published evaluations of software which could be recommended for use with adult populations (e.g., the Northwest Regional Education Lab in Oregon, the Bemidji/North Central Consortium in Minnesota, Luzerne Intermediate Unit 18 in Pennsylvania, the Alliance for Adult Basic Education in Nebraska, and the Adult Literacy and Technology Project at Pennsylvania State University).

There is an increasing interest in using computers for literacy programs for adults, particularly in conjunction with interactive video technologies. The Corporate Model Program in Austin relied heavily on a Steck-Vaughn 100 GED System in its programs for welfare mothers. That PIC is seriously considering using tool applications (e.g., word processing, spreadsheets) in their planned office training program for older workers. Also in Austin, the American Institute for Learning (AIL) program is developing a personal budgeting program for use with adults in the InfoWindow PALs program. In Wisconsin, SER, a national service provider, has a learning center which will provide literacy training for adults, using the InfoWindow PALS program; PALS is also the major literacy program for LEP populations in Massachusetts' Title III programs.

However, discussions with JTPA practitioners during this project clearly indicate that technology use with adults, while growing, is still quite low compared to its use with youth. For this reason the discussion below is predominately on service delivery to youth, except, of course, in the Title III dislocated worker programs.

1. Title II

JTPA's Title II(A) program authorizes funding and sets requirements for local training services for disadvantaged youth and adults. These funds are provided in a single grant with few legal requirements for particular types of activities other than a mandate that the SDA spend at least 40 percent of its source budget on youth under age 22. Activities may include job search assistance and counseling, remedial education and basic skills training, on-the-job training, specialized surveys, programs to develop work habits, education-to-work transition activities, bilingual training, vocational exploration, and the use of advanced learning technology for education, job preparation, and skills training.

The Title II(B) summer youth program is for economically disadvantaged youth aged 14 through 21. One hundred percent of the funds are allocated by the states to the SDAs. The funds may be used for remedial education, institutional and on-the-job training, work experience, counseling, outreach, referral, job clubs, and other training activities designed to provide employment to eligible individuals or prepare them for employment.

In 1986, Congress mandated that the summer youth program require all SDAs to: (a) assess the reading and math abilities of eligible youth; and (b) provide basic and remedial education programs which, as noted later in this report, have resulted in significant increases in funds allocated by SDAs to remedial programs.

In 1986, a survey of SDAs, conducted by the Center for Remediation Design (CRD) as part of an NCEP study, reported that 51 percent of the SDAs were using some type of computer-assisted instruction (CAI) in their Title II(B) programs. A year later, a parallel survey of 150 Title II(A) and (B) "youth planners" reported that 70 percent of the programs used computers as teaching tools and that 75 percent employed individualized, computer-based techniques (NCEP, 1988). A General Accounting Office (GAO) survey, conducted in the spring of 1987 on the Title II(B) SYETP, found that 70 percent of the SDAs used computers as teaching tools during the 1986 summer program (see Exhibit 1). While the three surveys were conducted at different points in time (two of them after the Congressional mandate), it would appear that use of computers is increasing in instructional delivery, especially for youth.

We should note, however, that several knowledgeable individuals, including members of the project's Expert Panel, felt that the survey findings should be interpreted with caution. While 70 percent of the SDAs reported having service providers or programs that use computers for remedial or basic skills instruction, most experts believe such use varies considerably, from one or two computers being used for placement/assessment, instructional management, or word processing instruction to extensive use of networks. Most knowledgeable individuals felt only a small number of providers within most SDAs are likely to use computers.

Exhibit 1

Delivery Approaches to Title II(B) Program

	Percent of SDAs 1986	Percent of SDAs 1987
Delivery approaches:		
Taught individually	69	72
Lecture and discussion only	13	7
Individualized, self-pace only	21	26
Both lecture/discussion and individualized/self-paced	64	61
Computers as teaching tools	70	73
Instruction tied to work	57	60
Incentives for participants:		
Academic credit	56	55
Wages, bonuses, stipends, or other payments	76	81

(GAO, 1987)

A number of other studies support these reservations. A recent TALMIS survey indicated that only about 11 percent of the responding schools used computers more in their JTPA-funded programs than in their regular education activities (TALMIS, 1988). A survey of microcomputer use in Florida schools, conducted by the Florida Department of Education, reported that computer use in JTPA-funded dropout prevention programs was only 20 percent as high as in Chapter 1 programs (Florida Department of Education, 1988); and computer use in Florida's JTPA programs is considered to be higher than most other states.

Regardless of the extent of overall instructional computer use in the JTPA system, it is clear that such use is growing. Below we describe and provide examples of the three basic ways this technology is used.

Computer-Assisted Instruction

Computer-assisted instruction is used extensively by local school systems, small community-based organizations and other organizations that provide Title II(A & B) services. CAI generally consists of stand-alone microcomputers (most often Apples) using commercially available educational software. CAI software used by school-based JTPA service providers is often similar to that used in Chapter 1 programs or related instruction.

The content areas in which CAI systems are most frequently used in Title II(A) and Title II(B) are reading, math, and written communications. In Appendix

A, we summarized data from approximately 30 projects (many of which use Title II funding) drawn from the National Alliance of Business (NAB) national data base (1984-87) and other NAB publications. Of the projects summarized, most SDAs used computer technology for such purposes as computer-aided instruction relating to basic skills acquisition, computer literacy, and for pre-employment training. PLATO was mentioned in two of the projects, with the CCP system mentioned in six. Five projects mentioned CAI but without specifying the type of system used. Computer-assisted instruction was also used for training in word processing, office automation, and computer applications. Six of the 29 projects (mostly for Title III dislocated workers) mentioned more sophisticated uses of computers, including training in computer-aided design/computer-aided manufacturing (CAD/CAM) and instruction in robotics.

During this study we have identified a number of for-profit and not-for-profit firms that use computer-delivered and computer-assisted instruction extensively in GED, remedial, and related skill development programs and who market their services to SDAs as service providers for Title II programs. These firms' estimated numbers include: 70,001 (60 center locations), OIC (25), SER-Jobs for Progress, Inc. (14), Control Data Corporation (50), Employment and Training Foundation, Inc. (6), Job Shop (13), Worldwide Education Services, Inc (22), and National Education Centers, Inc. (50+).

Computer-Managed Instruction

Computer-managed instruction -- either with or without CAI -- has become an important part of JTPA Title II instructional service delivery. A small number of Title II programs have decided to use the computer to manage the instructional process, relying for instruction on traditional workbooks, printed material, and only minor use -- if at all -- of CAI. One such program is the Competency Cabinet, marketed by Pace Learning Systems, which has an optional computer management system operating on Apple computers. The Competency Cabinet is used in 110 Title II programs in Alabama and in approximately 50 other programs across the country.

Developed initially to teach basic skills at the Draper Correctional Center in Elmore, Alabama, the program has also been used in correctional institutions that provide Title II(A) literacy programs in Georgia, Kentucky, and other states. The program relies heavily on contingency management techniques and attempts to change the learning environment of the participant.

Developed by the Remediation and Training Institute (RTI) with funding support from the Ford Foundation, the Comprehensive Competencies Program (CCP), now marketed by the U.S. Basic Skills Investment Corporation, is the most widely used computer management system of its kind in JTPA Titles II(A) and (B) (in over 250 sites). The CCP program is individualized, self-paced, and student-directed. Since 1983, RTI has franchised over 150 CCP "partners" who operate JTPA Title II programs. These partners -- which include regular and special schools, postsecondary institutions, community-based organizations, and job-training organizations -- have provided remedial education to more than 50,000 participants, with a current enrollment of approximately 25,000. A typical program serves 30 students at one time and has an average of ten microcomputers. All sites have at least one Apple computer; approximately ten percent have IBM PCs. Other equipment includes Sony, Control Data, and Texas Instruments. CCP programs also have printers, cartridge projectors, tape projectors, slide projectors, audio cassette players, and a range of audiovisual and print materials (from approximately 80 third-party vendors).

The Southeast Indiana PIC (Townsend Community Center) has developed a concept of Zero Dropout and is currently working directly with the public schools and the SDA to provide a variety of services, using support and materials provided by 70001, a national service provider. The CCP program is used in an alternative school environment. With recent funding from the Lilly Foundation, it provides services in an elementary and middle school to 60 students. The SDA also has established a program under Titles II(A) and II(B) for 14 to 21 year old students and adults. Although the program was only recently initiated (within the past year), participants in the basic skills program are showing 1.5 grade level gains after 60 hours of instruction.

While reflecting different educational approaches, all computer managed systems utilize the computer to diagnose and place students in the program, identify specific materials and lessons based on deficiencies, monitor student progress, and provide reports on mastery testing of lessons and preparation of summary reports. These systems tend to be used in smaller programs, primarily because they are less expensive than the more comprehensive computer-based delivery systems.

Computer-Based Delivery System

Computer-based delivery systems use computers, usually in a local area network, for both instructional management and delivery of instruction. These systems are more prevalent in urban SDA Title II(A) and (B) programs operated by local school systems or other large providers of remedial education. In many cases, the computer configuration has been designed to meet the specific needs of the Title II program, often including counseling and assessment services beyond instructional management and basic skills instruction.

Even though the computer delivery systems can be expensive, ranging in cost from $50,000 to $100,000, SDA officials and providers of remedial education programs under Title II have stated a number of reasons why such systems are advantageous:

- Independent evaluations of these systems find consistently that student achievement gains are greater than in control groups, and time savings of 20 to 30 percent can generally be expected in achieving mastery levels when compared with control groups.

- Many of the systems are relatively easy to operate; hence an individual such as an instructional aide (or peer tutor) who is trained in network operation can be used to operate the system, thereby reducing the need for higher-paid instructional staff.
- Most of the systems can provide the necessary information on student progress and other reports necessary for completing JTPA performance and other reports.
- While vendors often promote the technical benefits of local area networks (LANs), most experts and service providers note that the use of LANs (in conjunction with licensing arrangements) can reduce the costs per unit of software, provide more options for staff, reduce disc management problems, and provide motivation to participants who wish to peruse high interest programs on the network.
- Some of the vendors are willing to be paid, at least partially, on a participant performance basis, thereby reducing the risk to the service providers who have to meet performance standards.

A number of firms have developed computer-based delivery systems which are used extensively in JTPA Title II(A) and (B) instruction. Among the more prevalent of such systems are:

Computer Curriculum Corporation. One of the first and most widely used delivery systems throughout the country in Title II programs, the CCC system was developed in the late 1960s and subsequently refined for use in public school systems, parochial schools, correctional institutions, and other market niches. The CCC Microhost System generally includes 20 to 30 work stations which provide instruction in lesson "strands". Often the instructional staff is an aide or a "classroom manager" trained to operate the system. In addition to traditional K-12 areas, CCC has: (a) expanded its functional literacy programs for adults; (b) expanded and updated its GED preparation offerings in reading, math, and language arts; (c) introduced critical thinking skills strands in reading; and (d) included ESL language strands (five languages) for both youth and adults. Of the vendors selling "closed" instructional delivery systems, CCC has one of the most comprehensive set of offerings and courses to meet the needs of participants in JTPA programs and other at-risk youth and adult markets.

Control Data Corporation: PLATO/BEST. The PLATO system is another of the more widely known and used delivery systems in a variety of education and training environments. The Basic Education Skills Teaching (BEST) program, a recent successor to PLATO, has many of the functional capabilities required by the Title II program. BEST includes programs for drop-out prevention, drop-out recovery, and adult literacy. The Local PLATO Delivery System (LPDS) consists of a system manager and an instructional local area network for up to 30 work stations. The instructional management system provides individual student reports, class records, and other information used to manage instruction. The instructional software includes not only some of the original 2,000 PLATO software lessons, but also other vendor instructional software. The PLATO Education Services Division of CDC (which operates its JTPA programs) has entered into performance-based agreements with school districts operating JTPA programs whereby the school district's payments to CDC are reduced for students who achieve less than approximately one-half grade level equivalent gain for every 20 hours on-task. In addition to outright purchase, service providers may also "lease/-purchase" the system.

Prescription Learning Corporation. Another widely used computer delivery system is Prescription Learning's Basic Skills Program which is based on learning cycles involving pretest placement, prescription, self-paced instruction, immediate knowledge of results, and evaluation of performance. The system uses various other media and print materials in addition to CAI, and includes testing, consulting, maintenance, furniture, and installation. Its "Harmony" curriculum includes math, reading, language arts, and the popular English as a Second Language program developed originally for use in the Houston (Texas) Independent School District.

WICAT Minicomputer Instructional Delivery System. This system relies on a minicomputer with a variable number of work stations, depending on the program needs. One of the unique features of the WICAT system is that its courseware has been developed using an authoring system which can easily accommodate revisions and refinements and allows the instructional staff to develop units of instruction that meet specific local needs.

Ideal Learning, Inc. The Integrated Classroom Learning System, originally designed to provide supplemental instruction in math at the high school level, relies on a hard disc with 12 to 14 student stations. Teachers usually conduct large group instruction and then divide the class into two groups: small group activities and direct computer-assisted instruction. This system allows the incorporation of courseware and lessons developed by third-party publishers to be used on the instructional management system.

IBM Corporation. The IBM Principle of Alphabet Literacy System (PALS) is an interactive instructional program which uses the IBM InfoWindow system, including an IBM personal computer interfaced with a non-IBM videodisc player. It is designed to assist adolescents and adults with reading and writing abilities below the sixth grade level. A typical configuration includes four IBM InfoWindow systems, eight IBM PCjrs, four typewriters, and a learning facility for up to 16 students at a time. Students work in pairs and individually at the personal computers. PALS is used in several of this project's case study sites. The IBM Advance Network is also used in several Title II programs, including one of the case study sites. In addition to IBM "logoed" software designed to improve basic skills, some schools providing Title II services also use software from other publishers interfaced with the IBM PC CLASS instructional management system. In several of the IBM Job Partnership project sites (including the Austin case study site), the CCP is used for instructional management and is interfaced with the IBM network courseware.

Other delivery systems used in Title II programs include systems from Education System Corporation, UNISYS, and Wasatch Education Systems. The following paragraphs describe a number of effective uses of computer-based delivery systems in Title II programs.

A community-based organization (AIL) in Austin, Texas, operates the Creative Rapid Learning Center (CRLC), which makes extensive used of computers in several functional areas as a service provider of Title II (A) and (B) remedial programs (see Case Studies). Another IBM Job Partnership Project, in West Virginia, uses both IBM and Apple network configurations to teach basic skills and GED preparation for adults (16 years and older). It was expanded during the summer of 1987 to 12 sites with funding under Title II(A). The 12 replication sites relied on the Advance Network and, for the most part, IBM-logoed software. The program also used ESL materials and software to provide instruction for Spanish-speaking participants. Prospective administrators and teachers were asked to complete an instrument which indicated "how they felt about using computers for instructional purposes." While initial results were positive, even more positive attitudes were reported at the completion of the program. SEA officials reported significant student grade-equivalent gains, using standardized tests during the six-week period. In addition to the replication sites funded under Title II(B), the initial pilot site also established classes for school dropouts who had been separated from the community because of substance abuse or for other reasons (often requiring temporary incarceration) in an attempt to help them re-enter the community. Another CAI class was established in a kidney dialysis unit within a local hospital where dialysis patients and their families were provided instructional opportunities to prepare for the GED.

A New Haven (Connecticut) community-based organization, the Regional Education Service Center, uses computers extensively for both Title II(A) and (B) programs. Beginning with clerical/secretarial training in 1984, which has subsequently been partially funded (65 percent) under Title II(A), the program has expanded to include a literacy program which receives both Title II(A) and (B) funding. In both programs, equipment has been "loaned" to the project by vendors, partially because the Connecticut Department of Education does not allow the eight percent education coordination set aside funds to be expended on hardware. The literacy program is targeted on three different groups: (a) participants with less than a fourth grade reading level; (b) those with reading levels between the fifth and eighth grades; and (c) pre-skill development programs, particularly for adults. The literacy programs provided by the center are accredited by the school. The hardware configuration is essentially a local area network which is set up as a structured classroom rather than a computer lab. About half of instruction is provided by teachers; during the remaining time, students receive supplemental CAI instruction relying heavily on IBM basic skills software packages. The instructional management system is used extensively for initial testing, diagnosis, and prescription as well as for student monitoring, with mastery testing after completion of specific lesson plans. The center operates under performance contracts with predetermined competencies specified in advance by the SDA. In addition to basic education competencies, the program also includes a number of competencies related to pre-employment skills development including attendance, dress codes, developing resumes, and related skills. A business atmosphere is maintained in all training programs. The placement rate for the clerical/secretarial program since 1984 has averaged 95 percent, with significant gains achieved by participants in the literacy program. In addition, the center has also contracted with other community-based organizations to provide specific basic literacy skill development services to their participants who are involved in on-the-job and other occupational training programs.

The West Orange (Texas) Independent School District began an in-school remedial program for approximately 50 youth in January 1987, using the CDC PLATO program. During the summer, it initiated a Title II(B) program with approximately 50 other students, using both the PLATO LDS and PLATO standalone programs, focusing on basic skills. In September 1987, the school district continued the Title II(A) program for approximately 20 students who spend two hours, four days a week after school, in the program; in some cases, peer tutors formerly in the Title II(B) program are used. In addition to the PLATO LDS configuration (consisting of ten terminals), five Apple computers are available for diagnostic and assessment purposes. The PLATO LDS program objectives are linked to the Texas Essential Skills, the new, State-mandated curriculum objectives. The program includes some third-party software. Students conduct their own test score tracking and are provided opportunities to visit local employers. During the summer program, students averaged a .5 grade equivalent gain in ten weeks in reading and a similar gain in math. Students received two hours of reading and one hour of math instruction per day. In addition, a local JTPA regional office analyzed the WRAT scores and reported that the achievement gains in the program were "exemplary" and significant (at the .01 level) in both math and reading. The operating cost per student during the Title II(B) summer program was approximately $800. During last summer, the district found that the LDS network is much more cost-effective than the stand alone-PLATO configuration.

The Title II(A) program for adult readiness and occupational skills in Riverside, California has relied on the stand-alone PLATO system for several years. A primary focus of the program is GED preparation for which students are assessed every three weeks using the TABE. The program includes extensive support related to pre-employment skills development and for personal problems. It also uses staff who were previously in the program to provide instruction. Adult participants who enter the program with a sixth or seventh grade reading level and a fifth or sixth grade math level complete the program, on the average, in ten weeks, receiving 20 hours of instruction per week. The placement rate over the last three years has been 80 percent or higher with a cost per pupil to the SDA of approximately $12.50 per hour. The actual cost of operating the program is significantly less since equipment costs have been amortized over a long period of time.

Over the last two years, SDA No. 2 in Florida has used CCC with Apple computers for Title II(A) remediation in two counties. The program is funded in part by the eight percent set-aside and uses an excellent planning process with rural schools. Their goal is 1.5 grade gain in reading and math or 2.0 gain in one subject; 80 to 90 percent have achieved these goals. The program focuses on critical reading and higher order thinking skills. Another CCC model project is in Pensacola, Florida, where the Escambia County school district has reduced dropout rates from 39 percent to 2 percent in programs using the CCC system.

Some providers of remedial education in the Title II(A) and (B) programs have designed their own CMI/CAI systems, integrating software from third party suppliers. One such Title II program is operated by the Governor's Remediation Initiative (GRI), the state-wide SDA-contracted provider for South Carolina administered by Winthrop College (see Case Studies). In 99 high schools across the State, there are more than 100 computer-enhanced math labs and 85 reading labs and instructional management systems which operate on Digital Equipment Corporation's Rainbow Computers (math) and Apple Computers with hard disc (reading).

2. Title III

The Dislocated Worker Program is designed to assist workers who have permanently lost their jobs as a result of technological displacement, foreign competition, or structural changes in the economy. To be eligible, workers must be laid off or have received lay-off notices. States are given broad authority over who is to be served, how the program is planned and administered, how the resources are distributed, and what services are to be provided. Programs are usually established in response to major plant closings or to uniquely high unemployment labor areas.

The types of activities which can be funded under Title III include: job search assistance and job development; training for job skills in high demand; support services, including travel and personal counseling; and early intervention programs conducted with employers or labor organizations to minimize the adverse impact of facility closures. Seventy percent of the allocation to the state is to be spent on training and related services, which includes remedial education, tuition and entrance fees, and limited work experience.

Title III programs have a number of marked differences from JTPA Title II programs. Because Title III services are often required with little notice, a rapid response from the state's JTPA system is essential. The short lead time does not allow for extended program planning. As a consequence, Title III service providers tend to offer custom-designed programs tailored to specific industries, rather than the more general programs provided under Title II. Because Title III participants are, in general, more mature workers, they are usually more motivated and more targeted in their career objectives than their counterparts in Title II programs. All of these differences have implications on the use of computer technology in the delivery of services to dislocated workers.

For the most part, technology-based training systems used in Title III service delivery have been developed by private (usually large) employers, in some instances working in conjunction with unions. JTPA Title III funds are most often used to cover operational costs, usually in conjunction with state or other funding sources. Below we briefly describe a number of programs using various technologies focusing on different occupational areas funded in part by JTPA Title III.

One of the first and largest of such programs, initially funded through private, state, and Title II sources and subsequently using Title III funding is General Motors' new technological training program in Wentzville, Missouri. The program was designed to train or retrain displaced GM workers who are willing to relocate to the company's advanced technology plant in Wentzville. Workers in St. Louis, Detroit, California, Cleveland, Kansas City, and Saginaw were also sent to the Wentzville site for training and skills upgrading. Remedial and basic skills instruction emphasize both theoretical and hands-on training with specific machines and use group work techniques. Opportunities for brief refresher courses were also provided. Training and upgrading focused on hydraulics, maintenance, and welding in the operations of robots and automated manufacturing equipment. Basic skills and industrial electronics instruction was provided through the CDC PLATO program.

The CDC learning center in Charleston, West Virginia has operated a Title III program for the last two years for approximately 25 individuals who were dislocated because of the Volkswagen plant closing. These individuals received computer-based PLATO instruction in digital and robotic electronics. From entry levels of fourth to sixth grades, these individuals received instruction through college algebra. Similar PLATO-based instruction has been provided in other

Title III programs in the past. Eighty-one percent of the participants in the program were placed after approximately 640 hours of instruction in electronics and 85 hours in robotics. All participants achieved a college entry level algebra course. The cost per instructional hour was $6.75 per participant.

The Stanislaus County (California) PIC Title III program is designed to teach basic and remedial skills to approximately 600 employees of a Contadina plant which is planning to close down in the near future. The PIC operates the learning center, which is equipped with 20 CDC terminals using the PLATO LDS. Beginning in October 1987, the program provides the following services: testing, placement, diagnosis and prescription, math or reading instruction, and GED or high school diploma courses. The project provides on-the-job training and job development functions. Approximately $180,000 of funding has come from the state. The PIC director is planning to use the LDS in his Title II program following completion of this Title III project.

California State University is currently operating a Title III program for the Foothills Employment Council in Pasadena. The target population includes draftsmen affected by cutbacks at Santa Fe Braun, Inc. Draftsmen are being trained to operate expensive CAD-CAM equipment which costs approximately $80,000 per work station. While over 200 participants are involved, only 15 receive training under the Title III program. The contract with Santa Fe Braun covers operating costs primarily and not the cost of equipment which the company has contributed. Most of the participants have language problems or are handicapped. The university developed the program, and one of its staff members actually conducts the training at the Santa Fe Braun facilities. Participants often receive instruction while working in pairs.

The Human Resources Development Institute of the AFL-CIO has recently established computer-using Title III programs in Baton Rouge, Houston, Lake Charles, and New Orleans. These programs use the CCP along with a variety of Apple, Sony, and Zenith hardware. RTI has designed the CCP program for use in these sites, trained staff, and will provide needed technical assistance. The program is open entry/exit to accommodate the varying schedules of the dislocated workers from the hard-pressed steel (Houston) and oil and gas industries (Louisiana).

The Indianapolis PIC relies heavily on computers and related technology in a number of Title III programs. During 1986, the PIC established a computer-based literacy program (Job Primer) which includes five sites, one of which is the downtown UPwards site. The UPwards location has space donated by Blue Cross/Blue Shield and is equipped with the IBM PALS provided through the Indiana Department of Employment and Training Services. This program augments existing remediation curricula and targets the very low-functioning reader (fifth grade and below) who often spends a half day at the community site and an additional one and a half hours at the UPwards site using the PALS equipment. It also provides remediation and training in reading, math, communications, and specific job tasks for employed individuals. The use of the PALS program, which includes a touch-sensitive videodisc system and the correlation of literacy skills with occupational areas provided by local employers, appears to be effective. Individuals come to the site either as a result of self-referral or employer referral. Approximately ten percent of the participants in the newly organized program are classified as dislocated workers. During the current year, the program has served approximately 200 individuals, of which 65 positive terminations have occurred to date.

Since the early 1980s, the South Carolina Technical Education Center (TEC) has provided a number of skills training and continuing education programs in a range of technical disciplines funded under JTPA Title III. Organized as a state-wide network, the TEC colleges have developed certificate programs for more than 60 businesses in fields such as data processing, nurse aides, retail sales, carpentry, and electronic machine operation. In some instances, training takes place at company sites, while in others it occurs at the participating college. Advisors from "high tech" industries have assisted college resource centers in developing training curriculum.

A comprehensive dislocated worker program involving state and county governments, unions, and a variety of small businesses was established in the early 1980s in Niagara County, New York. The program's focus is on individuals aged 35 to 50 (many of whom are minorities) whose unemployment benefits have been expired for at least six months. Vocational skills, coupled with computer-assisted instruction for remedial education, are provided, as are pre-employment skills development, vocational counseling, and job clubs. Placement priorities are given to area small businesses.

A major dislocated worker training program has been established under the aegis of the Allegheny County (Pitsburgh, Pennsylvania) Community College. The program builds on a dislocated worker's former skills, matching them to skills in high-demand occupational areas, and provides training focused on the participant's deficient skills. The range of course offerings includes GED preparation and full two-year programs in computer science or engineering.

In addition to projects using different technologies as a method and/or the object of training, there are a number of single-application, technology-based programs and packages that can be useful to Title III service providers.

The Secretary of Labor recently announced funding of five interactive videodisc projects. Two of these are currently pilot testing the use of two existing interactive videodisc programs -- SKILLPAC, "English for Industry", and PALs -- to teach English as a second language to adults. The other projects involve the United Auto Workers (Ford Motor Company and General Motors) and Domino's Pizza Distribution Company.

The SKILLPAC has also been used with Title III programs for displaced shoe workers in Massachusetts. Preliminary results indicate that the SKILLPAC software has been accepted by Portuguese and Spanish-speaking participants and that the course can be effective in teaching listening/speaking skills. The program is operated locally by the Massachusetts Industrial Services Program (ISP), who contracted directly with Interactive Training, Inc., the developer of the interactive videodisc program.

3. JOB CORPS

Funded under Title IV(B), the Job Corps is an employment and training program for economically disadvantaged 14 to 22 year old youth. The Corps differs from Title II and III programs in two principle ways. First, the Job Corps is a nationally administered program, with a much more hierarchical and uniform administrative structure. Programmatically, this means that centers with similar programs operate through the use of nationally developed manuals, guides and procedures. This administrative uniformity has led to a relatively more stable program in terms of types and numbers of participants served.

Second, the Job Corps is designed for youth who need "intensive programs of education, vocational training, work experience, counseling and other activities." (Sec. 421) Over 100 Job Corps sites are residential centers, where the live-in environment facilitates the delivery of services described in part by this recent Job Corps RFP:

> "Job Corps has adopted a comprehensive, multilevel, self-paced placement and mastery-test-directed approach in an open-entry and open-exit individualized learning system. It is comprised of Job Corps tests and learning objectives and off-the-shelf instructional materials. Component programs include reading, mathematics, high school equivalency preparation, world of work (employability) skills, and health and hygiene instruction. Additional academic areas for which objectives have been defined and for which courseware is sought, are an advanced academic, pre-college level program targeted on the College Level Entrance Placement test (CLEP) and a functional competencies high school level program. A separate vocational program complements the academic of basic educational courses noted."

Computers are being used within the Job Corps in a number of innovative ways. A survey conducted by the National Job Corps Office in 1985 found that, at that time, approximately 60 percent of the Job Corps Centers were using at least one computer for computer-assisted instruction or other educational activities. Job Corps officials estimate that over 90 percent of the centers currently use one or more microcomputers for instruction. This survey also found that approximately 80 percent of the Job Corps centers used computers for word processing, either in normal operations or for training purposes.

A number of computer-based configurations are being used in Job Corps centers. The Gary Job Corps Center (San Marcos, Texas), operated by the Texas Education Foundation (TEF), currently uses a computer learning center which services between 300 and 400 participants. The network configuration is a University of Illinois "Cluster Program" similar to the PLATO system used previously but discontinued because of its high on-line telecommunication costs. The Cluster Program includes 130 lessons, previously taught manually, which have been modified/programmed for use on a Motorola computer. CAI programs in reading, math, and GED (readiness and grammar) supplement traditional Job Corps workbooks and materials, with lessons correlated by levels to the 1977 Job Corps workbooks. The diagnostic/prescriptive capability of the reading Cluster Program, as refined over time, is considered by some to be unique to the Job Corps. One of the five staff members who operate the computer learning center at Gary, discussed later, actively participated in reviewing courseware for the Job Corps evaluation project, and trained other Job Corps staff in implementing CAI programs. The center has also conducted evaluations and field-test validations of commercial software. Center officials are planning to expand the use of computers to such instructional management functions as monitoring student progress, diagnosis of deficiencies, and prescription of remediation. (see Case Studies)

Unlike the Gary center, the Phoenix (Arizona) Job Corps Center, operated by Teledyne Corporation, has a variety of computer-based programs that are used in specific areas. A small local area network operating on Commodore computers is used to provide remedial instruction in mathematics. Center staff have programmed the Job Corps instructional management system on the local area network and, using a Scantron scanner, provide opportunities for automated diagnosis, prescription, and student progress monitoring. The center also has a Control Data Corporation PLATO program operational on a network to provide supplemental reading instruction and test review for more advanced Corps members. The center also uses stand-alone Apple computers for a variety of functions, including remediation for limited English-proficient participants. Center staff plan to use the stand-alone Apple computers in the future for developing higher order thinking skills. Computers are also used extensively in test scoring; tests are administered to participants every 90 days. For math students, reports are generated with item skill analyses and provided to instructors within described CAI supplemental, remedial, or other traditional lesson plans. Computer-based scoring diagnosis and prescription does not currently occur with reading.

The Jacksonville (Florida) Job Corps Center, also operated by Teledyne Corporation, is a small center with approximately 250 participants. The GED instructional software is based on Job Corps workbooks and manuals and is used as a substitute, where appropriate, for traditional materials. Officials plan to expand the math and reading program beyond the GED (level ten) in the near future. They also plan to purchase the McGraw-Hill Instructional Management System and a scanner to automate the test scoring, diagnosis, and prescription functions in the GED program. The evaluation project is being conducted in a computer lab with ten Apple computers.

The Wolf Creek (Oregon) Conservation Corps Center, operated by the Forest Service/Department of Agriculture (under an interagency agreement with DOL), is using computers in selected areas and exploring use in others. The center has established a computer learning lab which provides computer literacy to all participants and instruction in programming for students with interest in the area. Computers are also used for CAI instruction in math, language arts, reading, GED preparation, and development of writing skills. Center officials are also exploring (through hands-on use) computer assisted design (CAD) and a number of data base and tool applications. In addition to the Apple computers used for CAI and tool applications, the center is also planning to acquire Macintosh computers, to be used for administration and instructional management purposes and to interface with a proposed Data General Management Information System planned for implementation in the near future. Center officials are extremely interested in purchasing an instructional management system which is technically and philosophically designed to meet the specific diagnostic, prescriptive, and reporting specifications required in Job Corps operations. Center officials feel that the availability of an effective instructional management system will allow the center to structure existing commercial software (which is designed primarily for group instruction) for individual, self-paced instruction.

A pilot program funded by the national DOL office is the Penobscot (Maine) Job Corps Center, operated by the Training and Development Corporation which also operates another Job Corps center and other JTPA programs in the Northeast. The program is using a refined and expanded version of the CCP to teach basic education (rather than GED preparation) and traditional Job Corps math and reading. Six teachers are involved, working in pairs with groups of 15 to 25 students. Four computers are used to implement the refined CCP management system, while six computers are used to deliver supplemental instruction in three different locations. Apple, Sony, and CDC hardware systems are used. The CCP program has an expanded capability for the writing portion of the GED (in anticipation of the new GED version) and expanded materials references for reading. Generally, because of the pilot nature of the program, instructional staff have greater flexibility to focus on individual student needs depending on projected career path (e.g., post secondary education, employment).

As an outgrowth of the steadily increasing use of computers in Job Corps centers, the National Job Corps office has undertaken an extensive evaluation of such computer use. This CAI evaluation project, currently being conducted in ten sites, has several objectives:

- to determine whether a computer-assisted program of basic education in the Job Corps is more effective in raising student academic levels than the current unassisted paper-and-pencil program;
- to determine the relative cost-effectiveness of using CAI in the Job Corps; and
- to identify the principal determinants of the variation in outcomes between the CAI program and the paper-and-pencil program.

Several important design features of the evaluation project are noteworthy. First, the ten centers were selected randomly within cells defined by geographic location, average entry reading levels of Job Corps members served, and center operators. Second, sample enrollees at each center are assigned to treatment (CAI) and control (paper-and-pencil) groups at random in order to minimize selection biases. Approximately 2,500 enrollees are participating in proportion to the enrollments at each of the centers. Third, the TABE test is being administered to evaluate Corps member's progress. The period of observation will be approximately ten months.

The courseware selection process was very lengthy, involving knowledgeable Job Corps center staff across the country. Listed in Exhibit 3, these publishers include both traditional educational software publishers and publishers whose orientation is specifically toward Job Corps objectives. It is noteworthy that two of the publishers -- Courses by Computers and Hartley Courseware -- supply software developed, in part, by developers who were involved in developing some of the original Job Corps materials (such as the PLATO Math Program and Westinghouse Learning Corporation Project Plan) during the late 1960s and early 1970s.

Exhibit 2

Publishers for Job Corps Microcomputer CAI Project

Hartley
HRM
BLS
Instructivision
Computer Age Education
Krell
Continental Press
MCE
Courses By Computers
Regents
GAMCO
South West Ed. Psych.
Houghton-Mifflin

One of the participating sites is the Clearfield (Utah) Job Corps Center, operated by Management Training Corporation. This center is using prescribed software on Apple computers, which were provided at no cost to the center for its participation. In the experimental CAI group, the typical student spends about one-fourth of his or her class time receiving instruction in a CAI mode and the remaining time with the traditional workbook lessons currently used in the program. One of the unique features of this center is that it has been designated as an alternative school for potential dropouts by the Utah Department of Education. All but one of the participating centers are using computer configurations which are integrated into classroom activities.

CHAPTER III

Barriers To Computer Use

While the use of computers in JTPA has grown remarkably in recent years, there are a number of factors inherent in the complex system which have mitigated against more pervasive use. Based upon discussions with the Expert Panel and others with an acknowledged understanding of computer use in service delivery, we have identified a series of barriers to effective computer use. In the discussions which follow, we describe briefly these barriers for the three principal JTPA programs. The reader should note that many of the barriers identified under Title II may be equally applicable to Title III or Job Corps programs as well.

1. TITLE II BARRIERS

As the largest and most diverse of the JTPA programs being discussed, Title II faced the greatest number of obstacles to effective computer use for service delivery.

Information/Orientation

Many SDAs and PICs are unaware of the potential benefits of using computers in remedial education and other SDA functions. Most rely heavily on advice from local school district staff and, without knowledge, many SDA decision makers are intimidated by computers. Many PIC officials and staff have expressed a need for information which: (1) provides details on the myriad applications of computers in a Title II program; (2) summarizes the effectiveness of different computer-based configurations for in-school, out-of-school, GED, adult, and other programs under Title II; (3) evaluates information about specific software packages and assessment/placement system which could be used in both Title II(A) and II(B) programs; and (4) describes vendor policies on hardware and software (e.g., networks, licenses).

Many hardware and software providers also expressed the need for information about the JTPA system, particularly Title II programs. During a meeting of the Software Publishers Association in October 1987, only five of the 65 leading education software publishers indicated they knew anything about JTPA. Because of the heterogeneity of the system, vendors who are interested in designing programs and configurations to meet the needs of the Title II(A) and (B) programs reported difficulties finding individuals who could define specific program needs. Several hardware vendors, who were interested in providing discounts (up to 40 percent) similar to those provided to school districts, felt the need for lists of approved (by state or local JTPA officials) service providers who could be given such educational discounts without creating legal problems.

School/JTPA Relationship

In the majority of SDAs remediation and instructional services are provided by educational institutions, most often the local school district. Naturally, the design of the educational component would be shared with, or at least influenced by, representatives of the school district. It is, therefore, critical that JTPA program designers and school representatives agree on the goals of the program before the appropriate technology can be applied.

The GAO study found that, in about a quarter of the SDAs, there are conflicting mind-sets which, in some cases, reduce the probability of computer use, particularly for remedial programs. For example, some SDA/PIC officials feel that local school districts have failed to provide adequate education, especially for at-risk students, resulting in the need for Title II in-school and out-of-school remedial programs. These people believe that, if the schools are to provide Title II services, they should provide an alternative service delivery to what they are currently doing inadequately in the regular school program (e.g., Chapter 1). The alternative often proposed is computer-based instruction.

On the other hand, some school officials, particularly those whose JTPA funding levels are significantly less than under CETA, feel that the requirements of performance-based contracts for producing basic skills achievement results are too narrow and believe that Chapter 1 programs which might attempt to develop "higher order of thinking skills" should be included in the Title II program, particularly for potential dropouts. These disagreements over Title II remedial education program designs often result in lengthy negotiating processes over the selection of specific computer systems and software to be used for Title II programs. Where this process has been effective (e.g., South Carolina), successful programs have evolved over time.

Funding Level

The impact of funding and changes in funding levels in the Title II(A) program on computer use is difficult to ascertain. No recent study similar to the GAO report on Title II(B) exists. Discussions with service providers and SDA officials who use computers to deliver basic skills, remedial literacy, dropout prevention, and related services indicate that changes in funding levels have a less serious impact in Title II(A) for a number of reasons. Computer-using service providers report that additional sources of funding -- such as the eight percent set-aside, foundation grants, state-funded programs, vendor "equipment loan partnerships", etc.--were available to cushion the impact of reduction in Title II(A) allocations. This is especially true of the 8% set-aside which has been used often as a source of funding for this technology. They also indicated that firms were more likely to provide "on-loan equipment" for Title II(A) than for Title

II(B) programs because of Title II(A)'s year-round operation. Some service providers indicated that Title II(A) in-school programs to prevent dropouts, for example, which used effective computer-based programs, were easier "to sell" to the school district and, hence, provided more readily in-kind and financial support from the district.

The same is not true for Title II(B) programs. The GAO estimated that, between 1986 and 1987, funds allocated to Title II(B) remedial services would increase from $36.7 million to $67.2 million and increase from five to 12 percent of the total Title II(B) program. In the average SDA, approximately $57,000 was allocated to the II(B) program to serve approximately 120 youths. For approximately one-fourth of the SDAs, the Title II(B) allocation per youth was as little as $200, while for another fourth, it was as much as $1,200 per youth. The average funding level for remediation per youth in 1986 was $773 and in 1987 anticipated to be $677. A recent study of network computer delivery systems found the cost to be approximately $1.20 per hour per student (CATE, 1986). If one uses the GAO figure of 12 hours per week spent on remediation per youth and assumes the summer program operates for 12 weeks, then the per-youth requirement for hardware and software would be approximately $228, or approximately 40 percent of the total Title II(B) funding allocation for remediation. Given this situation, it is clear that funds provided under the Title II(B) program are not sufficient to cover all of the costs of computer-based delivery systems and that such programs would in most cases, have to be operated year round or have additional sources of revenue to justify investments by service providers.

Both Title II(A) and Title II(B) face the problem of funding equipment purchases (with three to four year average lifetimes) out of operating budgets. Because equipment cannot be amortized, any such investment drives up unit costs for the year in which the purchase is made. Such increased short-term costs often act as a disincentive to investment, even when offsetting long-term benefits are likely.

The importance of these funding issues may be amplified because six percent administrative funding can no longer be used for equipment purchases as it once was.

Funding Uncertainty/Timing

The GAO report found that approximately 60 percent of SDAs felt that uncertainty regarding Title II(B) funding levels was a problem in developing remedial education plans. More than 40 percent felt that uncertainty about when funds would arrive was also a problem.

While the funding of Title II(A) 78% programs is fairly consistent both in amount and timing, Title II(B) programs face a much less stable funding environment. Congressional and administrative delays can result in funds for summer youth programs being made available too late for coordinated equipment purchases. Similarly, the distribution of eight percent funding is subject to decisions at state level which are often not made in a timely manner.

Staff Development

Although the newer computer technology is far easier to use than was equipment only a few years ago, many JTPA staff -- at SDAs and service providers -- do not have sufficient training to make the most effective use of their computers. Specifically, service delivery staff do not, in general, have sufficient skills for integrating CAI or CMI into education and training curricula nor are they fully capable of establishing or operating the networks used in computer-based delivery systems.

Perhaps more critical than the lack of highly technical expertise is the general lack of computer awareness by many JTPA staff. Improved staff training is needed to eliminate the underlying "computerphobia" evident in some staff and to reinforce the notion that, rather than a burden, computers are a valuable tool.

Performance-Based Contracts

JTPA programs operate as a performance driven system. Many SDAs employ performance-based contracts which are designed to withhold the bulk of the payment until participants are placed in unsubsidized employment or achieve some other program goal. These agreements call for full payments only if stated objectives are met. The inherent financial uncertainty, from the standpoint of the service provider, is a strong incentive for the service provider to operate at the lowest possible short-run cost. Such conditions are not conducive to investments in computer equipment (particularly unamortizable equipment) which could drive up short-run costs.

Reliance on Standardized Tests

A number of service providers (as well as school officials, publishers, and researchers) argue that performance-based contracts and program designs in remedial education, which are based on national, norm-referenced, standardized test scores, provide disincentives for two emerging uses of computers for target populations such as dropout and potential dropouts: (1) development of higher order of thinking skills (HOTS); and (2) development of tool application skills such as word processing and data base searchers (Resnick, 1987). While several HOTS programs, using a variety of software packages, have been successful in demonstrating some gains on national norm- referenced math and reading tests, these instruments do not adequately assess development of critical thinking skills (Pogrow, 1986). Some providers feel that the "competencies" agreed upon are too low or limiting for some participants (e.g., potential dropouts in Title II(A)) and do not address important other skills and behavioral changes. With the possible exception of assessing writing skills, none of the traditional national norm-referenced tests adequately measure tool application skills development, which would appear to be critical for individual success in the information age (Hunter, 1987; Resnick, 1987).

Federal and State Restrictions

As described in the discussion of funding barriers above, Federal restrictions can have a significant impact on the availability of resources for computer-related purchases. State JTPA agencies can also restrict (whether through regulation or interpretation) funding for computer purchases and use. For example, the Act sets aside eight percent of the funds allocated to states under Title II(A) for use in coordinating job training services with state education and training agencies. In a number of states (e.g., Florida, New Jersey, South Carolina), the state education agency has allowed SDAs to use 90 percent of the eight percent set-aside fund for purchasing hardware and/or software for the Title II(A) program. Connecticut, with stricter interpretations of Chapter 1 "supplement not supplant" provisions, has ruled that the use of eight percent set-aside funds for purchasing computer and other hardware for use in Title II(A) programs is not allowed.

Many experts, service providers, and some SDAs/PICs feel that states should be encouraged to review existing policies on allowable costs and other regulations which reduce the flexibility of funding for the use of computer-based programs in the Title II program.

Differential Constraints

The wide range of barriers described above constrains the use of computers generally in JTPA service delivery. There are a number of other factors that serve as barriers only to certain types of service providers -- most often private sector providers. To the extent that any restriction on provider participation reduces the diversity of program offerings available in JTPA, the system suffers and the likelihood of effective computer use is reduced.

As noted earlier, many SDAs and service providers rely on school-administered tests for initial appraisal, screening, and, in some cases, placement of participants in Title II(A) and (B) programs. The GAO reported that some SDAs have difficulty obtaining test information from schools. This can be partly attributed to different states' interpretations of Federal legislation regarding experimentation in programs using Federal funds. This factor is a disincentive for the SDA to select as service providers groups other than the local school district.

In the accreditation area, states apply different standards to JTPA programs, a factor that could have an impact on the types of delivery systems and service provider an SDA selects. In some states, providers have been awarded contracts under the provision that they must use certified teachers from the school system, limiting the range of service provider options.

2. TITLE III BARRIERS

While some barriers to use of computers and related technology in Title III are similar to those in other JTPA programs, there are a number of specific barriers which make computer use for training, remedial education, and other services more difficult in Title III programs.

Lack of Information

State Title III administrators are often even more unaware (and less interested) than Title II officials about potential uses of current technologies in their programs, except when the focus of retraining is in "high tech" occupational areas. Because of the timing and short duration of many Title III programs, typical sources of information -- such as vendors, journals, and technology conferences -- are not as readily available to state-level Title III program officials. Systematic information about available technologies and technology expertise is sorely needed, as is information about how technology can serve a useful role in Title III programs.

Short Lead Time

The short lead time usually accompanying plant closing and the types of training needed creates problems for planners, who are usually faced with two alternatives: (1) attempting to find "canned" packages which focus on general needs, but which might not be ideally suited to the needs of individual workers; or (2) finding a local service provider who can meet minimal service delivery requirements. To some extent, the lead time problem can be minimized in situations where employers, particularly large companies with technology-based training systems, take an active role in support of the training and skill upgrading services.

Program Design

Programs should be designed to minimize installation and implementation time, including in-service training. To the extent programs are participant-directed (perhaps in conjunction with peer tutoring), the requirement for certified staff during implementation will be eased. If programs require a highly skilled instructor, for example, with the complex equipment, the Title III program should be integrated into an existing program which could be modified for use with Title III participants. More so than with Title II programs, programs for dislocated workers require open entry/exit to accommodate scheduling requirements of participants and the use of equipment. The technology should be relatively transportable; effective scheduling may require movement to more than one site in a program area after a Title III program has been completed for use in other programs outside the local area.

An increasing number of Title III programs have involved limited English proficient participants. Design of such programs must take into account new delivery systems to provide basic skills instruction with these heterogeneous populations light of the shortages of ESL teachers. Videodisc technology can provide the flexibility to serve such heterogeneous populations, while other technologies such as distance learning can, with relatively low cost, use existing infrastructures (e.g., closed cable, employer-based TV, etc.) for specific populations for which resident technology and teachers are not available.

Disincentives for Technology Investments

The typically short durations of Title III programs provide disincentives, particularly for local service providers to invest in capital-intensive, computer-based technology, because it may be difficult to amortize the purchase over a number of years. For local service providers who traditionally charge tuition, JTPA Title III funds usually cannot pay full tuition fees, a disincentive for capital-intensive investments, especially where tuition fees reflect operating costs. In other instances where traditional education and occupational institutions are service providers, new technology-oriented occupational training (e.g., robotics, CAD/CAM) may not be included in courses which can be quickly accredited by appropriate state agencies. The inability of participants to receive credit for training is a disincentive for some participants to enroll. Another disincentive for investment in capital-intensive instruction is the availability of participant time to receive instruction in centralized locations, which is compounded by commuting and transportation costs.

Software Designed for Adults

The lack of computer and related technology-based programs designed for adults is a major barrier in itself. Many adults feel that they do not need instruction in reading and certainly are not interested in attending community-based or other programs designed for remedial skills development for youth dropouts. In virtually all cases, programs should be designed to teach basic skills in the context of work to avoid turning off workers who will not admit to deficiencies in reading, for example. In other cases, the basic skill components may have to be tied into high prestige courses and topics, such as fiber optics, CAD-CAM, and other high tech areas.

3. JOB CORPS BARRIERS

A number of barriers to expanded or more effective use of computers in Job Corps service delivery are similar to those for other JTPA programs; other are uniquely related to the Job Corps.

Funding

While funding uncertainty is less of a problem with the Job Corps than with JTPA Title II, the level of funding available to purchase hardware and, to a lesser extent, software is a problem with many facets. Cost competition for Job Corps contracts is so fierce that contractors cannot afford to invest heavily in computer-based systems. The budgetary process often causes a problem. For example, computer purchases may be included in capital equipment and maintenance line items that also include heavy duty and costly equipment such as bulldozers and facilities maintenance, etc. which, during the budgetary process, get a higher priority at regional DOL offices. As a result, most of the centers currently using computers for instructional and related purposes obtained their equipment through such special activities as the evaluation project, previous pilot and demonstration projects (e.g., Education Improvement Effort Project), special approvals by supportive regional offices who place high priorities on educational reform (Region IX), or local resources. Funding levels also limit staff training in computer use, which can be costly in remote locations where users must be trained in distant sites.

Lengthy Approval Process

Several officials reported that the overall approval process, including procurement procedures, is very lengthy, sometimes resulting in the purchase of equipment that is outdated. Others note that the approval process is so cumbersome that it serves as a significant disincentive for many vendors. In many cases, centers are using hardware that is as much as seven years old and, due to lack of maintenance funds, some stations are no longer operational. Moreover, the level at which approval must be obtained for computer-based education purchases varies among the DOL regions, which can create planning and related problems.

Compatibility

A major concern in the Job Corps (as well as in many other education/training programs) is the necessary tradeoffs between diversity and compatibility of hardware. While technology has greatly improved the ability of different type of computers to talk with one another, full-scale compatibility across brands is not a reality. This factor place special burdens on Job Corps decision makers to plan their technology-related decisions, recognizing that any type of computer will have both advantages and drawbacks.

Most center officials perceive the need for a variety of computers in order to take advantage of the best software available. On the other hand, as Job Corps centers increasingly implement management information systems (MIS), there is a tendency toward standardization to ensure that the MIS can be interfaced with instructional management systems used in the classroom. Several officials indicated a desire to use software developed at other centers, particularly those operated by the same corporation. However, in certain cases, incompatibility of hardware at the different sites precluded such opportunities.

Software Availability

Although most centers participating in the evaluation project are satisfied with the quality of software used in the treatment groups, some felt a need for high quality packages in GED preparation (especially the new 1988 GED version) and ESL. Most felt that, in contrast to the current use of CAI to supplement instruction, it would be difficult to find a computer-based delivery system which has the total instructional software capabilities to meet Job Corps needs. Most center officials expressed the need for new or improved instructional management systems designed for Job Corps use. A recent survey of center education directors identified some characteristics of an instructional management system which would satisfy their needs:

- CAI lessons should be correlated with competencies and in-

cluded in a computer-based directory;
- the system should do test-scoring and record test results;
- the system should print out specific lesson prescriptions based on test score results and teacher judgment;
- the system should allow for easy updating, particularly CAI software lesson plans; the system should also be able to record and report on participant time-on-task; and
- the instructional management system should be able to be interfaced with larger mainframe computer for general MIS purposes.

Most of the current instructional management systems being used have inadequate diagnostic and prescriptive capabilities or do not have the memory capacity to incorporate adequate skill correlations with materials.

Program Design Rigidity

Several barriers to effective use of computers perceived by center officials relate to program design rigidity reflected in Job Corps manuals, guidelines, etc. For example, several officials felt that the 1983 "manual" skill range was too limited, resulting in a propensity to teach only what is required in the curriculum. Several expressed a desire to use the computer to teach higher order thinking skills not currently included in the minimal requirements. Others felt the need for greater flexibility in selecting tests for assessment purposes.

Several officials participating in the evaluation project felt constrained by the prescribed program design and would have liked to use computers for additional purposes and in different ways. Most expressed their intention to expand the project's applications after the evaluation project ends.

CHAPTER IV

Policy Options and Recommendations

In this chapter we describe several policy options based on project findings. These recommendations have been derived from discussions with Expert Panel member, SDA/PIC staff, service providers, vendors, and other individuals knowledgeable about the JTPA system. The first general set of recommendations apply primarily to service delivery across all JTPA titles. The second set of recommendations address issues unique to a specific program.

GENERAL RECOMMENDATIONS

A number of the identified policy options would provide technical assistance for programs supported under JTPA Title II(A), Title II(B), Title III, and Job Corps.

1 CREATE INVESTMENT FUNDING MECHANISMS

Based upon extensive discussions with members of the Expert Panel and other individuals knowledgeable about the potential for increased use of technology in JTPA, it became clear that one of the greatest barriers to such use is the availability of "up front" funds to support initial implementation.

Most knowledgeable JTPA officials, experts, and vendors argue that the existing procedures bias the system against large initial investments in capital-intensive delivery systems because of: (a) the inability of SDAs/PICs to amortize capital expenditures; and (b) policies and regulations which restrict the use of funds for investments in hardware and software. A number of experts have recommended the creation of a funding mechanism for investment in capital-intensive technology.

One possible approach would be the creation of a line item for each of the JTPA programs earmarked for service delivery and management technology investments. This mechanism could be similar to the revolving fund concept used in the past by state employment service agencies, whereby investing agencies pay back, over time, funds initially provided by the revolving fund. Such an arrangement could be administered as part of the National Technology Resource Center.

2 CREATE A NATIONAL TECHNOLOGY RESOURCE CENTER

One of the major drawbacks to effective technology use in JTPA is the lack of a useful base of information on matters relating to technology use. Based upon discussions with the Expert Panel, the establishment of a National Technology Resource Center is recommended.

The National Technology Resource Center would receive funding from the Department of Labor to cover core center operations. Additional funding could be sought from foundations, employers, employer associations, unions, and other sources. The Center would be operated as an autonomous entity, with a Board of Directors representing both public and private organizations. Policies would be established to ensure continuity of funding. Management would be selected by the Board of Directors. The focus of the Center would include computer-based and related emerging technologies such as interactive videodisc, distance learning, instructional software systems, and artificial intelligence.

The Center would have three major responsibilities: (a) to collect and disseminate information to the various levels of the JTPA system and the technology community (including vendors and researchers); (b) to provide technology-related assistance; and (c) to support directly related research and software development through contracts with appropriate groups. Below we describe some of these proposed functions in greater detail.

Collect and Disseminate Information

The Center would collect (or facilitate the collection of) information, compile such information, and disseminate the information across JTPA programs -- to local SDAs/PICs, service providers, state JTPA offices, JTPA officials in DOL regional offices, and technology liaison officials within national DOL offices responsible for JTPA programs. The types of information to be collected and disseminated would include:

- **Technology-Related Resources:** Resources including individuals, groups, and clearinghouses which could provide useful and timely information to users. Information could be compiled and disseminated in updatable directories and on electronic bulletin boards using telecommunication gateways or an electronic network established by the Center.
- **Guidelines and Checklists:** Center staff could compile and/or develop guidelines and checklists for use at the SDA and service providers levels to assist in the design of technology-based programs and in communication with service providers. Center staff would rely (to the extent possible) on existing guidelines, checklists, etc. developed by groups such as the National Center for Research in Vocational Education, the International Council for Computers in Education, and other organizations concerned with technology use in literacy and related programs.
- Exemplary Programs Using Technology: Program could be identified on an ongoing basis, relying on existing reports and

case studies. Project descriptions would be compiled and presented in such a way as to assist SDAs/PICs and service providers in deciding how to replicate (and adapt, if necessary, to local needs) such technology-based programs.

- **Evaluations of Software/Hardware**: While the Center would not conduct evaluations of specific software and/or hardware components, it would compile evaluations conducted by independent evaluation groups. More than 20 such groups now exist as interstate consortia, associations, etc.; moreover, more than 500 state, local, and intermediate education agencies conduct software evaluations. The Center would also be responsible for compiling and disseminating software evaluation forms and criteria which could be used by SDAs and service providers for software preview purposes.

Facilitate/Provide Technical Assistance

Because technology-related needs will vary across states and programs, the Center would design and implement a technical assistance program based on the different needs. It would have a core staff of technology experts; technology liaisons would be appointed within the national JTPA program offices and in each of the DOL regional offices; state JTPA offices could also be encouraged to designate technology liaison individuals. In addition to the Center's core staff, two to three regional technical assistance centers would be funded in part by Center funds (matched by funds and in-kind contributions from state consortia). The technology assistance and support system would facilitate (or provide) the following services:

- **Program Planning and Design:** The Center would encourage the use of existing program design resources. Given the level of need across programs, the Center would also provide planning and design services including: (a) research and assessments with employers to ensure that programs meet potential employees' needs to perform successfully in the work place; (b) development of models of different technology-based configurations which could be used for planning purposes; (c) development of model program design specifications which could be used in negotiating performance-based contracts with service providers; and (d) on-call program design services ranging from telephone assistance to workshops.
- **Technology Systems Integration:** Because of emerging, sophisticated, computer-based systems and networks which offer potential for the system, there is a need for assistance in integrating technology into effective program configurations. Technology integration services, which the Center could provide, would include:

(a) serving as an intermediary between program planners and the technology community; (b) identifying components which are commercially available and assisting in their integration into cost-effective delivery systems; and (c) assisting in the development of RFPs and/or negotiating with vendors and/or service providers.

- **Forums for Service and Technology Providers:** The Center could facilitate, sponsor, or conduct forums, symposia, and/or workshops. Depending on meeting focus, attendees could include SDAs, PICs, employers, service providers, technology providers, and vendors. Meetings would be designed to improve communications among all parties (through orientation briefings and "give and take" sessions) and provide opportunities for employers to communicate projected work force needs.
- **Identification of Funding Sources:** Center staff would assist in designing programs to utilize JTPA funding flexibilities and communicate program needs to technology vendors. Such an activity could identify business practices (including lease-purchase options and alternative distribution channels, and support policies) which vendors might consider to accommodate the unique organizational structures and constraints of the JTPA system.
- **Monitoring of Advanced Technologies**: Center staff could continually monitor technology advances which could be used in JTPA programs and disseminate information about these advances to planners, technology liaison staff, and service providers.

Facilitate/Support Software Development

The Center would also have contracting authority to support (or facilitate support of) the development of software applications and other development activities designed to meet some of the unique unmet needs of JTPA service delivery. For example, the Center could serve a catalytic role in the creation of consortia of potential users with similar unmet needs (e.g., software for limited English proficient participants). These consortia could contract for the development of software, with the resulting products made available to consortia members at no cost. Subsequent distribution might be through low-cost channels under license with the publishers/developers. As priority unmet needs are identified, the Center itself could also contract for development of products.

One area in which a general need has been identified by Expert Panelists and knowledgeable officials is the development of assessment instruments, including: (a) instruments which assess higher-order and critical thinking skills development as part of remedial programs, particularly for dropouts and potential dropouts; (b) literacy instruments which assess basic skills as they relate to clusters of occupational areas; and (c) instruments which accurately and reliably assess the development of skills through the use of computer-based tools (e.g., word processing).

PROGRAM-SPECIFIC RECOMMENDATIONS

A number of policy activities relate to specific JTPA program activities.

1. TITLE II

Several options/initiatives which could expand or improve the use of computers and related technology in the Title II program include:

- encourage the creation of regional consortia of SDAs/PICs and community-based service providers in order to aggregate markets for hardware and software to obtain greater vendor discounts and to fund software development to meet common, unmet needs;
- encourage hardware and software vendors to develop lease-purchase policies which can accommodate the needs and constraints of the existing JTPA system and encourage states to provided to local public schools;
- encourage states to review existing state laws and regulations (e.g., state-wide hardware contracts, program and teacher certification, use of eight percent set-aside) and eliminate those that unreasonably restrict technology use; and
- encourage states to provide SDAs and service providers with reasonable access to existing assessment information which can be used in the participant appraisal/screening/assessment process and facilitate coordination, in the assessment area, between ES offices and SDAs/PICs to minimize unnecessary duplication of test administration.

2. JOB CORPS

Policies/initiatives that would result in expanded or more effective use of computers in the Job Corps include:

- Create a line item with an appropriate level of funding for instructional equipment separate from the capital equipment line item; this option would reduce time and problems in the budgetary approval process and would provide greater opportunities for uniform use of computers among different types of Job Corps centers.
- Modify existing Job Corps manuals to provide greater flexibility in the use of new, creative software to teach higher order thinking skills and to provide greater flexibility in using appropriate assessment instruments.
- Establish policies and procedures that would allow the Job Corps to serve as a national

laboratory for developing, adapting, and pilot testing computer-based instructional technologies; the focus of such activities would include improving Job Corps operations as well as field-testing and evaluating training programs that could be used in JTPA Title II(A), Title II(B), and Title III programs.

This policy would be consistent with the original legislation and policies which created the Job Corps in the mid-1960s. These procedures would also include appropriate funding for dissemination of information about Job Corps service delivery and pilot tests to appropriate JTPA officials.

- Encourage sharing of information about computer use in appropriate programs among Job Corps contractors, including information about DOL-funded pilot programs, DOL-supported software development and adaptation, and alternative uses of existing assessment instruments.
- Establish mechanisms by which ES and labor market information from many areas can be made available to Job Corps officials to enhance placements of Corps members in their home locales.
- Conduct a review of existing instructional management systems used in Job Corps and elsewhere to determine appropriateness of their use in Job Corps programs and disseminate findings to Job Corps center staff.

3. TITLE III

Many of the barriers to effective computer use in Titles II(A) and II(B) are similarly evident in Title III programs for dislocated workers. The unique nature of Title III, however, suggests that at least one program-specific strategy might be appropriate.

Among the characteristics of a good Title III program are "fast roll out and rapid ending" after the plant closing crisis is over. This suggests that the state, or better yet, a region have hardware and software materials that it can quickly deploy and then redeploy in a new situation. This may mean leasing equipment to a provider or making it available on some other basis. For this approach to be successful, the repository would need an assigned staff person who would know what was available and who could provide the "institutional memory" about what courses work in alternative situations.

One of the first initiatives to be undertaken by the National Technology Resource Center would be the design of two or three hardware/software configurations which could be used to provide remedial and skill development in most Title III programs. Based on a review of exemplary technology sites, some of the important characteristics of these configurations would include:

- open entry/exit to accommodate flexible participant scheduling;
- self-paced and self-directed instruction (including peer tutors);

- high interest-level materials and/or basic skills tied to specific occupational clusters;
- specific technology which can accommodate the needs of limited English proficient populations through audio and graphic overlays;
- specific technology delivery which can build upon existing use infrastructures (e.g., instructional television receiving facilities, cable systems, interactive telecommunication networks);
- technology which can be easily transported to locations with minimal cost and technical down time (e.g., the hand-held tutor for English as a Second Language developed by the Army Research Institute); and
- technology configuration which can be implemented without the need for skilled staff and/or instructors.

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APPENDIX A

Representative Projects Using Computers in JTPA Title II

General Motors New Technology Training (Wentzville, OH) receives funding from the State, JTPA Title II, and General Motors Corp.

Uses of the technology:

- Training to operate and maintain robots
- CAI in industrial robotics PLATO
- Basic skills

Dislocated Worker Retraining (Allegheny Community College, PA) receives funding from JTPA Title III, and the County.

Uses of the technology:

- Repair robotics

Learning Opportunities Center (Corvallis, OR) receives funding from the State Dept. of Vocational Ed. and JTPA.

Uses of the technology:

- Remedial basic skills

Elliot Training Center (Greenburg, PA) receives funding from JTPA Titles II and III.

Uses of the technology:

- Teach programming
- Teach CAD/CAM
- Teach computer application

Program to Reach Employment Potential (PREP) (Dayton, OH) receives funding from JTPA Title II and Dayton Board of Education.

Uses of the technology:

- Computer literacy

South Carolina Technical Education System (Columbia, SC) receives funding from state funds, industry in-kind contributions, and JTPA Titles II and III.

Uses of the technology:

- Advanced office operation
- Advanced machine tooling
- Microelectronics
- Computer Applications
- Robotics

Before Employment Skills Training (Rock Island, IL) receives funding from JTPA Title II.

Uses of the technology:

- CAI to teach pre-employment and work maturity comprehension (CCP programs)

New Horizons (Richmond, VA) receives funding from JTPA, The Edna McConnel Clark Foundation, Richmond Public Schools, and VA Community University

Uses of the technology:

- Basic skills
- Computer literacy
- Interpersonal skills
- World of work training

Comprehensive Countywide Dislocated Worker (Niagara County, NY) receives funding from the State.
Uses of the technology:
- CAI in basic and remedial skills
- Vocational skills training

Options, A School for New Skills (Washington, D.C.) receives funding from DES and the Ford Foundation.
Uses of the technology:
- CAI
- Job search skills

Retail Training Course (Atlanta, GA) receives funding from JTPA.
Uses of the technology:
- CAI
- Job search skills

Learning and Career Center (Mt. Clemens, MI) receives funding from JTPA, L'Anse Creuse and Public Schools.
Uses of the technology:
- Diagnostic testing
- CAI

Summer Youth Remediation Program (Newark, DE) receives funding from JTPA Title II.
Uses of the technology:
- CAI (CCP programs)

SER Learning Center (San Antonio, TX) receives funding from JTPA Title II.
Uses of the technology:
- CAI (PLATO)
- ESL, Adult basic education, GED

Adult Prevocational Remediation (Wilmington, DE) receives funding from JTPA.
Uses of the technology:
- CAI (CCP Programs)

Teen Parent Assistance Program (Oakland, CA) receives funding from Title II.
Uses of the technology:
- CAI for basic skills (CCP programs)

Dropout Prevention (Newark, DE) receives funding from JTPA.
Uses of the technology:
- CAI for remedial skills (CCP program)

Student Career Introduction Program (Louisville, KY) receives funding from JTPA and the State.
Uses of the technology:
- Computer science training
- Computer literacy

Pre-Employment Skills for Women (Sturgeon Bay, WI) receives funding from Title II.
Uses of the technology:
- Computer literacy
- Information management

College Motivation Program (Dayton, OH) receives funding from Title II and Wright State University.
Uses of the technology:
- Computer literacy
- Computer math

College Preparatory Program (Dayton, OH) receives funding from Title II and Public schools.

Uses of the technology:

- Computer literacy

Computer Industry Technology Program receives assistance from State funds.

Uses of the technology:

- Computer technology training

Huffy Corporation Training Program receives funding from the State and the Vocational Education Act.

Uses of the technology:

- CAD/CAM training
- Computer awareness

Custom Tailored Industrial Training

Uses of the technology:

- Microelectronics
- Robotics
- CAD/CAM

Upward Bounds's Metro Center Program (NY, NY) receives assistance from Educational funding.

Uses of the technology:

- Basic computer skills

Information Processing Specialist Program (Twin Falls, ID) receives funding from Title II, Department of Labor Women's Bureau and IBM Corporation.

Uses of the technology:

- Office automation training
- Word processing training

Partners in Education (Cincinnati, OH) receives funding from the Army Corps of Engineers.

Uses of the technology:

- Computerized weather forecasting

Youth Competencies Programs (Louisville, KY) receives funding from the Louisville and Jefferson Counties Private Industry Council.

Uses of the technology:

- Computer literacy
- Pre-employment and work maturity

Tampa Private Industry Counci'l (Tampa, FL) receives funding from JTPA, IBM Corporation, and business donations.

Uses of the technology:

- Computerized job placement
- CAI for basic skills

Data Source: NAB Clearinghouse

APPENDIX B: CASE STUDIES

Methodology

A series of five case studies were conducted to describe exemplary JTPA computer applications and identify any patterns across JTPA programs that use technology effectively. In the paragraphs below are outlined: (a) the criteria and procedures by which case study sites were identified; (b) the hypotheses tested during the case studies; and (c) the approach to data gathering and analysis during case studies.

A. SITE SELECTION

The identification of sites to be used for case studies adhered to a number of criteria and followed a set of procedures described below.

1. CRITERIA

The selection process, in actuality, involved two sets of criteria. The first was program criteria -- that is, characteristics that must be present in selected programs. The second set of criteria are descriptions of the group of sites as a whole, often representing factors of selection "balance".

Program Criteria

The preliminary criteria were discussed and refined as part of the Expert Panel meeting. An overriding criterion was the availability of existing information, either through interviews or reports, describing the program and its implementation process. Specific program criteria included:

- demonstrated performance in mastery of skills and/or competencies achieved by participants, as measured by an appropriate assessment instrument;
- innovative use of technology which fully utilized the capacity of the technology;
- ease of replication, implementation, and use by appropriate providers of service;
- availability of hardware and human resources to replicate the model program or key components in other potential sites; and
- demonstrated or potential cost effectiveness in the long- or short run.

Ongoing contacts with regional and state officials indicated that many officials have quite clear views of exemplary, computer-based programs within their purviews.

Many of them could not, however, articulate within the framework of objective criteria the reasons for their designations. As part of our site selection process, we attempted to fit recommended programs into our set of program criteria. We did not lose sight of the fact that the subjective impressions of these officials could be extremely valuable and should not be ignored even if their rationale does not fit a neatly defined set of criteria.

Group Criteria

The group of five case study sites were selected to provide a fair representation of the types of programs we wished to explore and to achieve a balance in terms of a number of exogenous factors.

Our plan for site selection called for the following distribution of program types;

- one local (SDA and service provider) Title II(A) and Title II(B) combined program;
- one local Title II(A) program only;
- one local Title II(B) program only;
- two Job Corps delivery systems (with one tied to Job Corps MIS);

The relatively small number of sites made it impossible to achieve any systematic selection across a large number of variables. However, a number of factors were considered in the final selection of sites; these included:

- **geography:** care was taken to ensure that one region of the country was not overly represented among the case study sites;
- **demographics:** local service delivery sites were drawn from communities representing a variety of urban, suburban, and rural settings;
- **state governance:** local sites were chosen to reflect variation in the nature and strength of state governance of JTPA; and
- **computer type:** the final set of case study sites included variation in the types (brands) of hardware and software being used.

2. PROCEDURES

The process by which case study sites were selected followed a series of formal and informal steps:

- Preliminary criteria were presented to the Expert Panel and NCEP staff.
- Based on this consultation with the Panel and NCEP staff, a final case study design was developed, including program criteria, group criteria, and criteria measures.
- Suggestions for exemplary sites were solicited from NCEP staff, Panel members, state and

regional contracts, national service providers and other groups serving at-risk populations.

- For the case study "slots" described above, more than 30 candidate sites were identified.
- Preliminary information on candidate sites were collected through telephone contacts and informal document requests. Effort was taken not to impose any reporting burden on candidate sites.
- A preliminary site selection -- along with the selection rationale -- was presented to the NCEP Project Officer.
- Based on NCEP approval, the selection of five case studies was finalized and the selected sites were notified.

B. HYPOTHESES

Below we list a number of hypotheses investigated in the case studies, along with some explanatory variables associated with the hypotheses. The general hypotheses to be tested across programs included the following:

- The initial impetus to use computers and related technology came from an advocate who championed the idea, both initially and then through the implementation process. Explanatory variables usually included: (1) the advocate had computer-related knowledge and expertise or had direct access to individuals with such expertise; (2) the advocate promoted the use of technology as a means to benefit either existing staff and/or participants in achieving program goals; and (3) while the advocate was a risk taker, he/she sought to minimize risks at critical points within the organization.
- Priority support at the policy level for technology use existed initially or was generated over time. High-level support was maintained throughout the implementation process as technology demonstrated success in meeting benchmarks and milestones in the accomplishment of the program's overall goals and objectives.
- The program using technology (and/or the primary institution responsible for the program) had organizational and funding stability. To the extent funding uncertainty existed, key promoters of technology sought to reduce this uncertainty through additional sources of revenue, promoting the program benefits to "stakeholders", and taking appropriate measures to ensure continuity of appropriate key staff throughout the implementation process.
- Prior to the use of technology, there was a program design with stated goals, performance-based objectives, and major operational procedures such that technology could be used as a means to provide efficient implementa-

tion. Variables associated with this hypotheses would include: (1) key policy makers and administrators who "knew what they wanted"; and (2) carefully designed specifications that were effectively communicated to service providers.

- Appropriate levels of staff development and ongoing support were provided throughout the implementation process. Variables associated with effective staff training include: (1) orientation to the technology, including functionality and utility; (2) hands-on equipment training at appropriate times; and (3) refresher training to update and expand technology applications. Characteristics of ongoing follow-up support include: (1) vendor support for service providers; (2) development of an internal care of staff to provide maintenance and other support; and (3) staff and funding allocated to support activities.
- service provider staff was involved in designing the overall program if not the specific use of technology;
- perceived benefits to staff and participants were communicated and understood by staff in an attempt to reduce anxieties;
- use of technology was effectively integrated into acceptable procedures followed by staff, including variables such as appropriate integration of courseware into curricula, correlations of courseware with objectives, and accreditation of programs by recognized authorities (e.g., state department of education or local school district); and
- appropriate incentives were provided to staff who actively supported and used technology in an effective manner.

C. CASE STUDY APPROACH

The general case study approach consists of two components: (1) descriptive analyses of individual cases; and (2) cross-site comparisons to identify patterns and test hypotheses.

1. DESCRIPTIVE ANALYSIS

The purpose of this case study component is to describe successful uses of technology, with the intent of providing useful information for replication in other programs nationally. For each of the cases, the following types of information are included in a descriptive analysis.

Context

Contextual information is primarily limited to variables which could have had an impact on computer-based technology use:

- general political and socioeconomic environment in which the program was planned and implemented;

- state laws and regulations which influenced program design and technology use;
- local program administrators' interpretations of JTPA program guidelines, regulations, etc. affecting decisions to use technology;
- overall local program priorities, goals, and objectives; and
- demographic information on participants (e.g., urban/rural, etc.).

Program Description/ Implementation Variables

The program description and implementation variables included:

- history of the program and/or the evolution of technology use in it;
- services/functions provided by the organization;
- specific uses of computer-related technologies;
- barriers encountered during planning and implementation phases and actions taken to overcome barriers; and
- factors contributing to the overall success of technology use in the program.

2. CROSS-SITE COMPARATIVE ANALYSIS

The purpose of the cross-site analysis is to test the study's general hypotheses, to identify any patterns or trends related to technology use across JTPA programs, and to provide insights into the intended and unintended consequences of various policy options. The analytical technique is one used by TURNKEY for the Office of Technology Assessment in conducting studies of successful Federal R&D programs supporting education technology (1987), in the case studies of the implementation of P.L. 94-142, and in other related case study projects.

Basically, the procedure involves linking successful program outcomes to factors contributing to the success, many of which could be aggregated at certain levels to relate to study hypotheses. The procedure begins with a review of the case studies; descriptive analyses and notes and offers preliminary identification of certain patterns and trends. Discussions between the Project Director and site visit team leaders were held to review critical items and responses to prepare further analysis. Finally, the cross-site analysis component of the case study report was prepared highlighting trends, patterns, and common factors across case study sites.

AUSTIN, TEXAS

Introduction

In this section we provide background information on the Austin/Travis County Private Industry Council (PIC) and describe the general use of technology in the PIC.

Background

The Austin/Travis County PIC serves the Austin metropolitan area, which has, since 1985, experienced a significant increase in unemployment. Today, unemployment is over seven percent. While services and government sectors have improved, the industrial sectors most severely affected over the last year are the manufacturing, construction, and restaurant trades. Construction activity has been hurt by low occupancy, an abundance of new office buildings. and a stagnant residential market. The trade industries have felt pressure from the slowdown; eating and drinking establishments have been especially hard hit. Local government and some health service industries have, on the other hand, posted moderate gains over the last year.

The local PIC board has seven representatives from large private firms, one from a small business, and six from small minority businesses. Also on the board are representatives from veterans' groups, organized labor, local community-based organizations, the Austin Business League, Austin Independent School District, Texas Employment Commission (TEC), community colleges, senior citizens groups, and rehabilitation agencies.

The PIC staff consists of ten full-time employees including an executive director, deputy director, fiscal officers, contract compliance specialist, MIS specialist, planner, program coordinator, vocational evaluator, and administrative staff. The PIC executive director has been in his current position for about two years; before that, he directed the rehabilitation and personnel division of Goodwill Industries, a key subcontractor for the PIC JTPA program.

Because of the worsening economic situation over the last two years, the SDA's JTPA allocation has increased to approximately $1.7 million, of which approximately $250,000 is devoted to administrative staff and budget. This increase has provided some funds for investments in computers for administrative use.

The major programs/providers and their funding allocations are displayed in Exhibit A-1. In addition to the three programs which have been selected for case study review, other major programs include:

- Goodwill Industries, which provides remedial education and training options for youth and adults, including work adjustment training, personal/social adjustment, vocational ESL, job readiness training, and electronics assembly training, under both Title II(A) and (B).

- Middle Earth, which operates Title II(A) and II(B) programs to develop independent living and life skills; specifically, the program is designed to: (a) improve the educational level and employability of youth through counseling, career assessment, and work experience; (b) increase the motivational level of youth; and (c) provide direct services benefiting the elderly community.
- SER-Jobs for Progress, which has operated Title II(A) and II(B) programs for several years and currently is providing basic education and on-the-job training programs; the SER program is currently expanding its use of computers to provide remedial instruction and office skills training.
- Youth Employment Service, which provides training services, under Titles II(A) and II(B), including work experience, job readiness, job search assistance, part-time work experience, classroom training, and office skills under Titles II(A) and (B).

In 1986, the PIC served 722 Blacks, 660 Hispanics, and 465 Whites, for a total population served of 1,847. The Black and Hispanic populations served by the PIC are approximately 25 percent higher than their incidence within the general poverty population in the Austin area.

Over the last year and a half, the PIC has developed a number of high priority activities:

- It has increasingly focused on single parents. In 1986, almost half of the 707 participants placed in full-time employment were single female parents, with children under age six.
- It has focused on "at-risk youth"; three of the eight major programs are in dropout recovery, dropout prevention, and/or related activities.
- It has made a concerted effort to focus on economic development by forming a Business Advisory Committee with representatives from major corporations and government agencies.
- Within the last year, the PIC has taken a proactive role in marketing its services (e.g., assessment and counseling) to corporations and expanded its services that would normally be provided by service providers. The assessment and counseling service is computer based (as described below). This priority can be attributed to the PIC's perceived need to diversify its sources of revenue beyond the JTPA and to provide services to corporations willing to assist workers and potential employees who do not qualify for participation in JTPA-funded programs.

Exhibit A-1

Major Program Providers

	Total Funding		Funding Source
AAUL (Urban League)	$112,074		Title II(B)
CISA (Community in Schools)	105,500		Title II(A)
Creative Rapid Learning Center	390,000	210,000	Title I (A)
		125,000	Title II(B)
		55,000	Section 123
David, Beverely	77,698		Title III
Goodwill Industries	385,000	250,000	Title II(A)
		135,000	Title II(B)
Huston-Tillotson	122,150	71,750	Title II(A)
		50,400	Title II(B)
Middle Earth	258,698	125,000	Title II(A)
		133,698	Title II(B)
SER	530,862	227,000	Title II(A)
		303,862	Title II(B)
Texas Employment Commission	270,750	200,000	Title II(A)
		7,750	Title III
Texas School for the Blind	24,000		Section 123
Youth Employment Service	385,584	215,000	Title II(A)
		170,584	Title II(B)
TOTAL	**$2,599,316**		

In addition, the PIC has implemented a number of provisions to ensure that the JTPA program is even more performance driven than in the past. For example, a 15 percent "hold back" clause has been included in all recent Title II(A) contracts to ensure that contractors enroll the contracted number of eligible out-of-school youth. It has also developed several other contractor policies, including: (1) no payment for enrollment until 30 hours of training had been completed; and (2) payment for job placement after 21 days of employment for adults and after seven days of employment for youth. As a result, the PIC proudly points to its success over the last year, as displayed in Exhibit A-2.

The Austin/Travis County PIC uses computers and related technology extensively in both program administration and service delivery. Each of the ten staff members has his or her own IBM-compatible computer.

Exhibit A-2

PERFORMANCE COMPARISON

(FY86 PIC: July 1, 1986 to June 30, 1987)

	Plan	Actual
Total Served	800	1,117
Total Entered Unsubsidized Employment	425	711
Total Youth Served	425	508
Total Youth Entered Unsubsidized Unemployment	200	274
School Dropout	303	367
Adult Cost/Positive Termination	$3,242.44	$1,753.46
Youth Cost/Positive Termination	$3,610.83	$2,626.10
Average Starting Wage at Placement	4.58	5.01

Use of Technology

LOTUS 1-2-3 (one of the most widely used spreadsheet programs) is used by several staff to negotiate and monitor performance contracts. All staff have access to the data base, which includes information on the current status of each program by service provider. This system is used for monitoring and selecting service providers and negotiating continuation contracts.

A data base program is used to provide data to the Texas Department of Commerce (TDOC), under which the JTPA office was recently placed. The PIC can access the TDOC data base. However, since the TDOC is currently selecting a new computer for state-level use, the PIC is not planning to develop an on-line access capability until that decision is made. Another reason the PIC relies on its own data bases is that the TDOC program cannot report on individual programs.

As described below, computers and scanners are used extensively in the PIC's assessment and counseling program.

The PIC has the capability to access the TEC job bank in order to determine, for example, eligibility of participants for the Title III program. However, it decided to contract with the TEC to provide these services and does not use this capability. The PIC MIS generates numerous reports for internal management purposes, including: enrollments, training completions, placements, wage rates, employment retention, performance payments to providers, and employment reimbursements. These reports can be accessed by the LOTUS 1-2-3 program to monitor service providers, determine payments, and report data to other agencies.

The PIC is planning to expand technology use in both administration and service delivery. For example, it is establishing, as part of its business economic development thrust, a small business bid procurement system, similar to one recently developed by the Houston PIC. This system will provide customized information to small business on procurement announced in the Commerce Business Daily, as well as on contract awards which may provide small business subcontract opportunities. The PIC is also interested in reviewing the CCP ESL program being developed at the Multi-Cultural Interim Program (a technology development group) in Washington, D.C. for possible use in its planned services. The PIC plans to initiate, in the near future, an older workers program in cooperation with a local service provider. In this program, the PIC will assess the effectiveness of computer-based instruction, particularly related to word processing and spreadsheets, which will be used as part of the instructional program.

Senior PIC staff and board members believe that computer use in PIC administration and service delivery has been extremely beneficial, esulting in reduced staff time in preparing reports. They believe it has enabled them to implement and monitor performance-based contracts, has improved the performance-driven nature of the program, and has freed staff time from administrative duties to such an extent that PIC staff can now reallocate time to marketing its services to private corporations and other groups outside the JTPA system. Because of the PIC staffs successful use of computers in administration, they are even more convinced than before that computers and related technology can be used effectively in service delivery areas.

Description of Programs

Generally, computers are used more extensively in the Austin SDA that in other SDAs. Below we describe several programs which use technology in an exemplary manner.

Service Providers

Since 1984, the American Institute for Learning (AIL) has operated self-help programs for dropout youth for the Austin/Travis County PIC. AIL's flagship program is the Creative Rapid Learning Center (CRLC) which provides services under both Title II(A) and II(B); a dropout prevention program has also been established in Johnston High School, modeled after the CRLC.

Having worked with at-risk youth for more than a decade and having established a model creative arts reading program, AIL is a nationally recognized, community-based program. It has a long record of providing effective programs for inmates of correctional institutions and other hard-to-serve populations. In addition to JTPA-funded services, AIL provides services to other groups and institutions, some of which relate to technology use. For example, as part of the IBM Study Partnership, AIL has developed courseware and has tested and validated additional courseware developed and marketed by IBM for use with at-risk populations. Also, it is helping to design correlations between IBM software and the CCP program. It is developing a videodisc-based program on budgeting for functionally illiterate youth and adults and is helping IBM and

Interactive, Inc. to correlate segments of the "What's Next?" videodisc program to CCP objectives and competencies. Under a grant from the Mott Foundation, AIL also conducts policy research on at-risk populations. In 1984, AIL staff actively participated in the design of a state-wide study of dropouts and subsequently submitted a report to the state legislature which led to recently passed legislation (H.B. 1010). AIL receives funding from a variety of sources, as described in Exhibit A-3.

Exhibit A-3

AMERICAN INSTITUTE FOR LEARNING

1987-88 Proposed Budget

Funding Sources Over $5,000

Revenue Sources	1986-87	1987-88
City of Austin	$ 85,790	$ 85,790
Travis County	83,251	83,251
PIC (86-87, 87-88)	113,830	227,625
Mott	60,000	50,000
IBM	21,500	11,500
Meadows	0	40,000
Texas Comm. for Arts	6,500	6,500
RGK	0	10,000
PIC Title II(B) Summer	125,000	55,500
Tuition	12,278	22,500
Donations	2,160	17,500
TOTAL	**$510,309**	**$610,166**

AIL has a full-time equivalent staff of approximately 18 including certified teachers, assistant instructors, and specialists for counseling, intake, outreach, job development, and creative arts. Many of the staff have backgrounds in liberal and creative arts. Most staff received training in technology use after joining AIL.

AIL staff, particularly the executive director, have developed strong professional relationships with important community groups. For example, the chairman of the board of AIL, a former Lockheed executive, is on a sabbatical to serve as Chairman of the Austin Chamber of Commerce and Chairman of the Governor's Task Force on Vocational Education. Another AIL board member serves as a director for the Austin/Travis County PIC.

AIL's unique attributes include prior staff experience in the use of technology. The entire staff is totally dedicated to the philosophical approach underlying the programs operated by AIL. AIL began using microcomputers in the early 1980's, when several microcomputers were donated; training was provided by a variety of groups. In 1984, AIL became heavily involved in developing the CCP program and received extensive support from the Remediation and Training Institute (RTI), in which recently created a new marketing group (U.S. Basics, Inc.). Subsequently, some key AIL staff have become seasoned trainers for other CCP users and participate in RTI's National Academy training programs.

In addition to technology use in service delivery, AIL also uses computers and related technology in management and support functions. Eighty percent of AIL staff have their own computers which they use for word processing, internal reporting, and analysis of student records and program effects. Scantron data scanning equipment is used extensively to enter data into the CCP program. Apple Macintosh and IIe equipment is used heavily in developing proposals and quarterly reports to RTI. Plans are underway to expand the use of computers, particularly Macintosh and IBM System 2, to other administrative and reporting functions, including an electronic mail/bulletin board system to link all AIL sites and possibly all CCP sites in Texas. AIL has taken a lead role in a joint effort between the newly formed Texas Basics, Inc. and the Texas Association of PICs, which received a $100,000 grant to develop training program linkages among service providers and PICs throughout the State.

Technology-Based Services

Three separate JTPA programs operated by AIL and two operated by the PIC provide technology-based services.

(1) Creative Rapid Learning Center (CRLC) -- Title II(A) Youth

The CRLC is designed to assist high school dropouts aged 14 to 21 in acquiring basic employment, as well as academic and functional like skill competencies to prepare them for entry into successful employment in the Austin labor market. In the current year, approximately 135 youth are participating in this multifaceted program. Most participants enter the program with reading capabilities below the seventh grade level. The program provides a comprehensive mix of services, including:

- academic remediation and GED preparation, using the CCP;
- communication, creativity, and self-esteem building;
- pre-employment and life skills training, which follow the state-approved youth competency and occupational knowledge regimen;
- job placement and ongoing follow-up; and
- counseling and network services provided by CRLC staff, employers health and child care professionals, social service agencies, vocational training institutes, and local colleges and universities.

The nucleus of the CRLC is the CCP program, a competency-based and structured curriculum including lesson plans, benchmarks, master tests, and instructional aids. The CCP system includes CAI lessons operating on stand-alone Apple computers. CRLC is the first Texas site to use the IBM Advance Network system, operating on an AT file server with eight enhanced IBM PCjrs. In addition, the program includes about 100 IBM software titles designed to improve basic skills.

One of the unique aspects of this program is the "mapped" correlations of the IBM software to the CCP program. AIL staff developed these correlations and the taxonomy which interfaces the two systems.

The CCP has three tiers of instruction:

- **Tier 1:** basic competencies directly equivalent to reading and math instruction in grades one through four; this tier emphasizes CAI and print approaches including life and employability skills.
- **Tier 2:** an intermediate competency level which covers remedial academic instruction for approximately grades five through eight; CAI and print materials are primarily used, supplemented by audiovisual materials.
- **Tier 3**: advanced competencies which are designed to prepare participants for high school tests, GED, armed services vocational aptitude battery, or college boards; a comprehensive array of employability and life skills materials are used extensively in this tier.

The CCP instructional management system is the heart of the program for student-directed, self-paced, open entry/open exit instruction. Reports on attendance, pre- and post-tests, mastery tests, competency achievements, grade-level gains, and hours on task are created automatically by the Apple computer. Prescriptive lesson plans, available through the IBM network, are also built into this system. The Test of Adult Basic Education (TABE) is used as a pre-test for determining a learner's entry grade level. It is readministered after approximately 100 hours of study time to determine grade gains. If reading levels are below the third grade level or if a learning disability is suspected, the participant is referred to the Austin Literacy Council for instruction. Each participant is interviewed by the training director and/or counselor to determine educational, career, employment, and other interests and needs, and an Employability Development Plan (EDP) is developed. In addition to the TABE, CCP diagnostic tests are used to place an individual in the program and prescribe lessons for that individual.

Depending on the participant's placement in the program, other tests beyond mastery tests (including pre-GED tests) are administered, evaluated, and documented within the CCP system. The CCP instructional management system captures all test scores and provides opportunities for analyses of strengths and weaknesses by instructors and program administrators. One critical element in the CCP is training for both teachers and students. CCP instructors have to be certified by RTI (now U.S. Basics) and, in many cases, the teachers in the CRLC are also certified by the State of Texas. The CCP program is also certified by the Texas Department of Commerce, as the CCP lesson plans have been correlated to the Texas Essential Skills, the recently mandated State objectives for all Texas schools.

Participants in the program receive approximately five days of training in the use of the CCP system, including the instructional management system, test scoring packages which use Scantron scanning equipment interfaced with the Apple computer, and the IBM network. In a very real sense, the participants are trained to teach themselves as the entire approach is participant-directed and self-paced. During the site visit, the study team staff person was briefed on the CCP by a recent graduate who "just dropped into the Center to see if he could help out." At a recent national conference on technology and adult literacy, sponsored by Pennsylvania State University, a participant in the program (not AIL staff) briefed conference attendees on the operation of the CCP and the IBM Advance Netware system. AIL staff believe that such training is not only motivational and educational, but also develops a sense of value and accountability.

Of CRLC'S 125 Title II(A) participants served last year, 95 percent received positive termination compared to 71 percent for the PIC as a whole. Participants during the second quarter of 1987 averaged 1.24 grade equivalent gain in reading and a 1.66 gain in math. Of the 82 youth involved in the 1987 summer program 70 percent demonstrated "significant grade level gains in math and English", while 98 percent returned to school and 95 percent completed training.

(2) Dropout Prevention -- Title II(A)

Since January 1987, AIL has operated a dropout prevention program at Johnston High School. Each semester, approximately 40 students, ages 14 to 16, identified as potential dropouts, are referred to the program by school counselors and other staff. The object of this program is to increase academic gains, motivate students to remain enrolled in school, and to master youth competencies and occupational knowledge. During a five-month period last spring, 40 students participated in the program; only two dropped out and 37 were enrolled in school in September, 1987. During the five-month period of instruction, the average reading grade gain was 1.24, while the math grade level gain was 1.66.

The program used at Johnston High is very similar to the technology configurations used at the CRLC, with several exceptions:

- in addition to stand-along Apples and the IBM network, other stand-alone microcomputers (e.g., Apple II + and Texas Instruments) are used with such commercial software as PLATO;
- AIL coordinates their activities more closely with regular

teachers, counselors, and parents to assist participants overcome their barriers to high school success; and
- in addition to IBM, Lockheed supports the program by providing periodic assistance through donation of staff to serve as tutors and mentors.

There are a number of, not insurmountable, problems with a standard school system and a self-paced, student-centered program operated together. For example, students who go beyond the grade level materials assigned to them may, upon approval by the principal, receive testing provided by local universities for advanced placement credit. Some older students may not continue in the program after they reached age 21 because they were no longer permitted legally to go to school. Indeed, one of the three individuals who dropped out did so for this reason. Another problem relates to determining participants' eligibility for the dropout prevention program funded under JTPA. In a program for 14 and 15 year olds, operated by Huston-Tillotson College, PIC staff indicated that only 35 to 50 students in need would or could provide the necessary information to determine program eligibility.

(3) Summer Youth Employment Program -- Title II(B)

In 1987, AIL operated a summer youth program for 82 youth. Of this total, 98 percent returned to school, 95 percent completed training, and more than 90 percent demonstrated significant grade gains in math and English. The goal of the program was to increase academic abilities, computer literacy skills, life skills, and work experience of in-school youth ages 14 through 21. In addition to the regular academic remediation and pre-employment job readiness training, a program component (conducted by IBM instructors) provided work experience and intensive computer skills training in office occupations for ten participants.

The program which has been proposed for follow-on funding for the summer of 1988 occur at both the CRLC and Johnston High School, with approximately 30 participants at each site.

As with last summer's program, remediation, life skills, and educational enhancement will be provided three hours daily over a six-week period for participants aged 14 through 16; 16 to 21 year-old participants who are below grade level will also be eligible for remediation. Classes will also be available six hours a day for pre-employment and job readiness training. Eligible participants will receive specific skills training by IBM instructors in the Computer Office Skills Training (COST) program. To be eligible, students must have a ninth grade proficiency level and be interested in office careers. The course will include an introduction to computers, computer keyboard training in work processing, spreadsheets, and data base management programs.

One relatively unique aspect of the CRLC program, including the summer youth program, is its emphasis on the development of life skills. The life skills instructor is an extremely competent individual who has dealt with at-risk youth in public school environments and exemplifies the CRLC philosophy of hands-on learning with strategies designed for each individual. The training program which he developed builds heavily on work experiences within the CRLC, where he attempts to instill in participants the value of basic skills as they relate to on-the-job success. Last summer, for example, the basic skills math program emphasized drill-and-practice lessons from the building trades; participants assisted in building a kitchen and other facilities at the Center. The life skills instructor has also trained a number of participants to operate the IBM Advance Netware system; in doing so he has carefully selected lessons related to office occupations and equipment maintenance and repair. He has attempted to integrate basic skills and remedial education into occupational areas in a novel way, building on the experiences available at the CRLC.

(4) PIC Corporate Model Program

In 1986, the PIC initiated the Corporate Model Program in cooperation with the Department of Human Services (DHS) and the Texas Employment Commission. The model was designed to improve coordination among DHS, TEC, and PIC programs involving single parents receiving AFDC to provide them opportunities to attain employment and become financially independent.

During the last year, 96 participants (aged 16 to 42) were served. While the majority had high school diplomas, their level of functional achievement was slightly above the seventh grade level. Unlike many programs operated under subcontract with service providers, this program was operated by the PIC in its headquarters office.

The technology nucleus of the instructional program was the Steck-Vaughn GED-100 system. In some respects, it is similar to the CCP; however, the initial price of the system is a great deal lower than CCP. The GED-100 system uses a combination of computer-managed instruction and CAI supplemental instruction, in combination with a variety of print and audiovisual materials.

The curriculum and lesson plans include a variety of print materials from such publishers as Cambridge Publishing, materials from a university-base program (e.g., University of Kentucky), and a variety of software made available to the program by the Austin Community College (ACC). The instructor was hired part-time from her employment at the ACC to direct the GED program.

Initially, some participants resisted using the computer for instructional purposes. Over time, however, this problem was overcome through the patience of the instructor, the acquisition of highly motivational software (focusing on areas of high interest to adults), and a focus on practical life skills (e.g., word processing) relevant to employment.

In additional to the instructional delivery, the PIC also uses a sophisticated, computer-based assessment and counseling program with the participants. Marketed by Pesco, of Pleasantville (New York), the JOBS system is quite comprehensive including aptitudes, physical demands, environmental conditions, temperaments, and interest patterns, among other factors. A variety of tests are administered in developing an individual evaluation plan for the participants.

One of the more widely used tests is the Valpar series. As participants complete the appropriate batteries, the results are entered into a computer which immediately displays the results for review with the individual by the counselor. One unique capability of the JOBS system is that Pesco provided, for the Austin PIC, a locally customized data base on local employers which have available positions keyed to DOT classifications. The assessment and counseling services provided by the PIC are being marketed to private corporations for a fee of approximately $500 per participant.

(5) Broyhill Dislocated Worker Program -- Title III

The PIC recently initiated a dislocated worker program, funded under Title III ($75,000), for 150 of the 280 former employees of Broyhill Manufacturing which recently closed its Austin plant. Sixty of these workers have limited English proficiency and approximately 75 percent are functionally illiterate. Several also have handicapping conditions.

The PIC administers the program and provides assessment and counseling services similar to those used in the Corporate Model Program. The PIC has also subcontracted to a group responsible for outreach and appropriate remedial/training programs. Operated at the DeWittee center, the program's primary training objectives thus far have been pre-employment skills development. Another group involved in this program is the Texas Employment Commission, which is responsible for all of the intake processing of participants and coordination with the Office of Unemployment Insurance. One of the key functions provided by the TEC is determining eligibility of participants for the Title III program. The TEC relies on its MIS, which maintains records on individuals who are considered for participation in the program.

Barriers To Technology Use Or Technology-Using Programs

Barriers to technology use which have often plagued other PICs and service providers are few and minor in Austin. Most of the potential funding problems, especially for initial investment in technology, were minimal as AIL received the hardware and software at no cost for participation in the joint IBM study; AIL also provided direct services (e.g., software development, correlations, mapping) to IBM for which they were reimbursed. As one of the initial CCP sites, AIL also received materials and extensive technical assistance and training. The purchase of hardware and software for administrative and other functions by the PIC was funded through the large increase in JTPA allocations over the last two or three years. Most of the service providers also had additional sources of revenue to cover or to share some of the initial costs of investment in technology.

There are, on the other hand, a number of current or potential barriers to continued or expanded use of technology. The PIC has expressed the need for more information on hardware and software which could be used in the program. The PIC staff have relied on word-of-mouth for such information and, until recently, had travel funds to go to conferences or other sites using technology. Because of travel and related budget reductions, PIC staff feel they will have to rely heavily on service providers and/or vendors (IBM, RTI, or Steck-Vaughn) as primary information sources. The AIR also expressed the need for access to useful information to assist them in selecting software, for example, to update the CCP. Since AIL plans to begin using the IBM InfoWindow videodisc system, there is an expressed need for additional information on videodisc programs and model programs using videodiscs. AIL officials also want to establish an information network among PICs and service providers which focuses on technology-related products, subjects, and issues.

Both the PIC and service providers have expressed concern about the JTPA eligibility criteria and feel that the process for determining participant eligibility is unduly time-consuming and burdensome on both staff and participants. As a result, it unnecessarily reduces the number of participants who could and should participate in such programs. For example, when the Johnston High School dropout prevention program received JTPA funding, intake officials found that many students originally in the program were unable to provide the necessary information to determine eligibility (many parents were leery of providing such information). Other PIC-administered programs suffered similar reductions in participation for the same reason.

Observers of the Johnston High School dropout prevention program have applauded AIL's introduction of a student-directed, self-paced learning system into a school facility with a traditional, time-based environment. Attempts have been made to minimize several certification problems (i.e., certifying teachers, providing opportunities for advanced placement, testing for students who advance beyond their grade level). There are also a host of minor problems which constrain the effectiveness of technology use in this type of setting and the realization of its full potential. To varying degrees, all concerned parties (including the PIC, AIL, the school, IBM, and Lockheed) have expressed a desire to resolve as many of these problems as possible. Alternative models are being designed for use in planned expansion of this concept in additional schools in the near future by AIL, IBM, and U.S. Basics.

PIC and AIL officials recognize a potential problem resulting from the success of the program and its selection as a model national site -- namely, how to handle the projected requests for information and on-site visits from interested parties around country. The AIL director expressed intent to seek funding assistance from a local foundation or group to cover staff to provide these services, in order to minimize disruption to operational programs. PIC officials also believe that national demonstration projects have the potential of creating similar problems and burdens placed on them. They expressed a desire for greater cooperation between hardware vendors, service providers, and other groups to minimize this burden, while at the same time providing opportunities for visitors to view their programs.

Success Factors

The success of the technology-using programs in Austin can be attributed to a number of factors.

First, the performance-driven nature of the overall PIC program, building on performance contracts with appropriate incentives for providers, encourages providers to use the most effective and appropriate technology to achieve participant objectives. Moreover, it adds objectivity to the service provider selection process, thereby minimizing political influence (e.g., to select certain providers).

Second, the partnership nature of the program goes beyond formal requirements. PIC administrative support to service providers has been one important aspect; the roles of AIL's president and executive director in obtaining community, state, business, and other support has been significant; and the services and support provided by such vendors as RTI and IBM have also contributed to overall success.

Third, in the eyes of outside observers, the most critical factor contributing to the successful use of technology has been the dedication and capabilities of the service provider and PIC staff. The AIL executive director not only has extensive experience and a track record in operating successful programs for at-risk youth, but also is extremely capable of raising funds to purchase technology (or obtain it on a loan basis). All instructional staff come from nontraditional teaching backgrounds and are dedicated to serving at-risk youth populations. All have also been effectively trained in the use of the appropriate technology configurations.

Fourth and last, the technology configurations used in Austin have unique features which contribute significantly to the program's success. The self-paced, student-directed CCP system integrated with Apple stand-alone and IBM network configurations contribute to success by: (a) empowering students, thereby increasing self esteem; (b) instilling values of personal accountability; (c) providing an environment in which students succeed rather than fail; and (d) developing competency skills in which participants can measure their own success. As AIL staff members note, however, while technology is important, a comprehensive program designed to meet the needs of each individual is the hallmark of success.

Closing Comment

Below we summarize some of the lessons learned in Austin and important considerations for possible adoption in other sites:

- A partnership must be built on mutual interest with appropriate incentives for all parties. Strong leadership roles for all parties also appear to be critical.

- Multiple sources of funding (e.g., foundations, vendor donations, JTPA, among others) which provide opportunities for both the PIC and service provider to diversify and purchase/obtain initial hardware and software are critical. Non-JTPA funding for programs are also needed to serve those participants in need but not eligible for JTPA programs.
- Dedicated staff with necessary expertise to use the technology effectively is important; staff experience and/or expertise in motivating at-risk youth is critical.
- While technology can facilitate the implementation of an instructional program, it is only one of several important components of a comprehensive services program to meet the individual needs of participants.

Implicit in these lessons are the conditions which should exist in other sites contemplating the use of such a competency-based instructional delivery program as CCP and the use of networks for instructional purposes. These important conditions might include: (a) positive attitudes among teachers and school staff for in-school dropout prevention programs (i.e., that at-risk youth can succeed); (b) availability of incentives for service providers to do a good job, reflected in future RFP criteria and appropriate incentives for staff and participants; (c) a student-directed philosophy of individualized instruction; and (d) a facility and environment which is conducive to learning. In short, most observers of technology-using programs in Austin believed that computer-based delivery was an important ingredient, but that these other conditions and factors contributed more to overall program success.

SOUTH CAROLINA GOVERNOR'S REMEDIATION INITIATIVE

Introduction

The State of South Carolina operates the majority of its JTPA programs through a single-state service delivery area called the Governor's Remediation Initiative (GRI). The State is a recipient of JTPA Federal funds and is the administrative entity for the programs.

The Division of Employment and Training, housed in the Office of the Governor, is responsible for JTPA programs. The Division is undergoing changes -- re-assignment of existing staff and an influx of new staff. The recently-elected Governor is in the process of assessing current programs and establishing new priorities. The exact future direction of the State's JTPA program is, therefore, rather unclear.

The State's single service delivery agency operates seven programs, including: (a) classroom training; (b) skills training, including occupational, with some basic skills; (c) on-the-job training; (d) individual work experience; (e) programs for in-school use, including pre-employment, work maturity, and related training; (f) job search assistance; and (g) remediation services included in the GRI.

The current budget for all JTPA programs in South Carolina includes:

- Title II(A) -- $21 million;
- Title II(B) -- $9 million;
- Title III -- $1.8 million;
- JTPA eight percent set-aside -- $2.3 million; and
- JTPA six percent incentive -- $2 million.

In South Carolina, as in many other states, there exists a strong correlation between low student achievement and poverty. An analysis conducted in 1985 by GRI staff found that in seven counties where the percentage of poverty was less than 20 percent, the percentage of students below standard in reading was always under 30 percent. In counties where the percentage of poverty was greater than 20 percent, the percentage below standard in reading was always in excess of 30 percent.

Another prevalent problem within South Carolina has been the high incidence of teen-age pregnancy. In 1986, approximately 3,400 babies were mothered by young women under the age of 18. Another 5,300 pregnancies were aborted or miscarried. Eighty percent of teen-age mothers do not complete their education. These and other trends within the State, including education reform initiatives, have contributed to the creation of the Governor's Remediation Initiative.

Description Of Programs

Below we describe the GRI, including the subcontractor (Winthrop College) which administers the program, the historical evolution of the program, and the current technology-based programs being used.

Winthrop College

The GRI is administered by Winthrop College, one of South Carolina's four-year public colleges. The decision to place the program at Winthrop, was, according to officials, made because of the College's substantial leadership and commitment to teacher preparation and expertise in technology.

The Winthrop College unit responsible for the GRI has an Acting Director, an evaluator/MIS specialist, administration assistant, and clerical staff. Under a subcontract, the Sumter Area Technical College provides technical assistance to school staff on hardware and software usage. The two staff persons involved under this technical assistance subcontract also monitor the implementation of the program design to ensure that it is being implemented as planned.

The objective of the program is to develop and implement a collaborative remediation system, to be jointly used by school districts and the technical education system, which will enhance the employability of students. The system is based upon reading and math curricula in a learning-resource laboratory setting, which is competency based, prescriptive, individualized, and measurable. There are 99 high schools involved in the GRI program, housing more that 100 math labs and 85 reading labs.

In 1984, the initial GRI was funded by the Office of the Governor's Division of Employment and Training. Total funding was $4.5 million (from State funds and the eight percent set-aside) which established the program at Winthrop College. It was funded for a three-year period, commencing July 1, 1984 and ending June 30, 1987.

The target population of the GRI is at-risk youth who score in the lowest quartile on the California Test of Basic Skills (CTBS) or are below standard on a South Carolina state-wide test, the Basic Skills Assessment Program (BSAP). Both of these instruments are used to assess reading comprehension, vocabulary, reference skills, math computation, and math concepts. The CTBS was used as both the pre- and post-test during 1986-87. Approximately 10,000 students were served in the program last year, with about 13,000 students being provided services this year.

While Winthrop has attempted to target development on those schools with the highest proportion of economically disadvantaged youth, it appears as if the main criterion for selection has been the willingness of the schools to implement the programs. As noted later, determining income eligibility for students has been a general problem affecting the program recently.

Technology

In the mid-1970's, the first Director of the GRI began developing an individualized program within the technical school system. The primary foci of the curriculum were reading, math, and English. The system relied very heavily on paper and pencil, print, and audiovisual materials. CETA and other funds were used to develop this initial curriculum.

In 1976-77, the technical schools integrated this individualized curriculum into the overall teaching strategy of all the technical colleges in the State. Over the next eight to nine years, the curriculum was refined and revised.

During the early 1980s, initiatives were undertaken to begin using computers for both instruction and instructional management. Computer-assisted instruction was designed to supplement, not replace, the print and audiovisual means of delivery. Officials state that the selection of Apple hardware was based largely on the rapidly increasing base of educational software which executed on Apple equipment.

In 1982, the instructional management system, which included diagnostic and prescriptive capabilities, was programmed for use on DEC Rainbow microcomputers and was provided to 13 sites for their use. More than $150,000 was received under a Ford Foundation grant to develop the system. Interfaced with a scanner, this system was used for test scoring and student record keeping. The instructional management system focused primarily on math and included various audiovisual materials which were used to supplement existing materials and reinforce concepts.

In 1983, the Governor's office began developing a state-wide initiative to test the resulting technology-based instruction management system as a teaching tool in high schools in the State. A key official in the Office of the Governor convinced others in the office that the system should be targeted for at-risk high school students to upgrade their basic skills.

Shortly thereafter, the State legislature passed the Education Improvement Act of 1984, which required competency testing for all high school students before graduation. Through the efforts of the individual noted above and his participation in the education improvement movement in South Carolina, programs were established to ensure that at-risk youth would not fall even further behind and drop out of school. Since July 1, 1984, the Office of the Governor has committed approximately $5.2 million of JTPA eight percent funds to established and implement the GRI program.

In 1985, when Winthrop College became the subcontractor for the GRI program, a major effort was undertaken by the staff and consultants to evaluate more than 800 software titles that could be used in the curriculum and to correlate these titles with objectives in the instructional management system. The instructional objectives were also correlated with the State competency testing program. The six-volume compilation of software evaluations of math and reading titles represented the first major effort to identify software that not only could be used with at-risk youth, but also was related to State competencies/objectives. Growth of the program is displayed in Exhibit B-1.

Exhibit B-1

GROWTH OF GRI

Year	Type	Number of Labs Funded	Cumulative No. of Labs	School Districts
1984-85	Math	9	9	4
1984-85	Reading	6	6	2
1985-86	Math	73	82	43
1985-86	Reading	0	6	2
1986-87	Math	22	104	58
1986-87	Reading	51	57	39
1986-88	Math	0	104	58
1986-88	Reading	12	69	46

The total cost for setting up these labs has been approximately $45,000 for math and $60,000 for reading, including teacher costs. The GRI, using JTPA eight percent set-aside funds, provides approximately $16,500 for math and $25,000 for reading. In most situations, laboratories are designed to have ratios of one teacher per 12 students, with four computers. Three computers are typically provided by the school and one through GRI funding. Initial funding was spent on hardware and software.

Through negotiations, schools, for example, provided hardware and the GRI funds were used to provide other materials and equipment.

Initial grants also provided for training of approximately 140 teachers in the summer of 1985 on the Winthrop campus. The college provides approximately 40 hours of teacher training for lab teachers participating in the GRI program. State certificates (including college credits) were awarded to those successfully completing the training. Teacher training included the used of program materials, instructional management software, and computer use for instruction. In 1986-87, as new math and reading labs were added to the network, an additional 60 math teachers and 120 reading teachers were trained at Winthrop College.

Exemplary Technology Use

The GRI currently uses three exemplary technology applications to provide remediation instruction and support.

(1) Math Labs

In the math labs, four stand-alone Apple computers are used to provide supplemental CAI instruction. A variety of commercial software, which has been correlated to State and program objectives, is used. Most of the software titles were purchased from ten or so different software publishers. The diagnostic/prescriptive system, operating on DEC Rainbow microcomputers, is available to diagnose, assign levels, and assign tasks. This diagnostic/prescriptive system was developed under the Ford Foundation grant in the 1980s and is used extensively in the 16 technical schools across the State. It does not, however, have the capacity to monitor student progress.

In addition to this system, which is used in all of the math labs, there are 15 labs now using the Learning Management System (LMS) available from Computer-Based Training System (CBTS) of Calgary (Canada). This comprehensive system is designed for basic skills and occupational training. The LMS operates on a DEC computer located in high school labs funded under the GRI program.

The CBTS has licensed the technical schools to use the program and has allowed any high schools which can be connected through local telephone lines to have access to the system. This system includes test banks and correlations which were custom developed for South Carolina by the GRI. As new materials are identified and as test items on the State competency test change, GRI staff can make appropriate changes in the LMS. The one-time cost of the LMS license is $15,000 per site (technical school). Plans had been underway to expand the LMS to all of the 16 technical schools within the state in the future; however, funding uncertainties and the limited capability of some technical colleges to accommodate the system could limit expansion.

(2) Reading Labs

In each of the reading labs there are approximately four Apple IIe microcomputers; Apple IIgs's microcomputers are use for CAI instruction in a supplementary manner. The diagnostic/prescriptive system is on an Apple computer connected to a 20-megabyte hard disc. It can provide diagnostic/prescriptive capabilities and assists in monitoring student progress. Reading teachers do most record keeping, test scoring, etc. by hand rather than by computer.

Students may receive prescription, which includes lessons available to them on DuKane audiovisual equipment or from print material. Typically, as a student finishes a particular module, she is tested for mastery and, if she passes four out of five items, the student proceeds to the next learning module. Most instruction is individualized, self-paced, and student- directed.

The instructional management system used in reading is a customized version of the Prescription Learning Corporation's IMS. Approximately half of the CAI lessons are published by

Prescription Learning System, with the remainder available from other commercial third-party software publishers. Most of the reading curriculum (including some software selected for the program) was developed by a committee composed of GRI high school teachers. The committee was headed by a reading faculty member at Winthrop. The "mapping" of lessons to state objectives was then made available to Prescription Learning, which integrated them into their IMS. Hence, this instructional management system is custom-designed for South Carolina use.

Most observers and staff expressed the need for a more sophisticated instructional management system in reading, particularly one which could automate the scheduling, testing, and scoring process and provide other opportunities to reduce staff time and paper work, thereby allowing for increased teacher-student contact time.

(3) Telecommunication Network

One of the most unique features of the GRI is the communication network between Winthrop College and each lab. Initially, a technical college mainframe computer was the hub of the network. Subsequently, the GRI acquired its own mainframe. Each school has toll-free access to the Winthrop mainframe three days a week. A computer inquiry about the curriculum, its management, the motivation of students, or any problem (e.g., curricula-checking, hardware) related to the math and reading labs is usually answered with the same day by Winthrop staff.

An estimated 16,000 pieces of electronic mail will travel annually over six toll-free WATTS lines into GRI's electronic post office. About a quarter of this electronic mail will be addressed to the project director and the Winthrop College staff. The other 12,000 messages will be passed among teachers who share information, ideas, and experience in a collegial environment. The GRI network is building team spirit among a sizable corps of teachers committed to the success of computer-assisted instruction in South Carolina.

In Exhibit B-2, the number and brands of microcomputers and related hardware used in the GRI program is displayed.

Exhibit B-2

GRI TECHNOLOGY SUMMARY

Computer Equipment	JTPA(Title II(A))Funds	School-Purchase
Apple IIe	124 (reading) 106 (math) 230	372 (reading) 273 (math) 645
Modems	110	0
Hard Disc with Mgmt. System	67	0
Rainbow	106 (Math)	0
Printers	40	55
Apple IIs	12	0

Benefits

Participants' test results for the first two years of the program, measured by the Normal Curve Equivalent (NCE) score on the CTBS math and math concepts test, have improved. The expectation for all students is zero NCEs per year, since gain is relative to their counterparts on normal curve tables. The goal of the program is to show gains greater than one NCE. As stated in GRI's 1987 final report, "The overall gains by students far exceeded the usual expectations, proclaiming a successfully effort". While test results for the 1986-87 year are currently being calculated, preliminary findings indicate that the average NCE math gain in grades 10 through 12 averaged 5.0 NCEs on computation and 4.9 NCEs on concepts. A similar averaged NCE gain for reading was 1.5 NCEs for the same grade levels. Gain scores in reading comprehension ranged up to 3.2 NCEs for 11th grade students. Reading lab student gain scores were less consistent than math. This may be attributed partially to variations in district implementation policies. In some cases, the units are used for English credit, which diminished the time and effort for reading.

The GRI has been one of the most cost-effective Title II(A) program, as far as JTPA funding is concerned. Over the last four years, the total JTPA cost per participant, including original investment and subsequent operating costs, has been approximately $100. During the last year, the JTPA operating cost per participant has been approximately $40.

In addition, and perhaps because of GRI's success in increasing student achievement, particularly in math, 32 schools outside of the Title II(A) JTPA-supported program have adopted the GRI computer-based learning system for use in regular education programs. In the 1987-88 school year, it is estimated that the financial commitment by the adopting school districts will amount to more than a half million dollars. A State

Department of Correction facility has also adopted the lab at their own expense.

In addition to expansion of the program into other school districts, the GRI has undertaken or is planning to undertake several initiatives related to further curriculum development, network support, and systems evaluation. These initiatives include:

- development of an authoring system for new math lessons which allows nonprogrammers to develop the software;
- continued development of the reading curriculum which began in 1984;
- continued software evaluation in English, math, reading, and critical thinking skills.
- continued refinement of math curriculum by correlating CAI and other materials with BSAP state tests; and
- expanded field-testing of the Learning Management System using DEC-based system.

Major Barriers to Program and Technology Use

Over time, through an evolutionary process, a number of barriers (e.g., staff resistance, lack of technical expertise, funding level uncertainty) have been overcome by GRI staff. Currently, there are still a number of major barriers.

One problem centers on JTPA income eligibility. As noted earlier, at-risk youth are identified for participation in the program based on educational deficiencies. At that time, they can be enrolled in a lab. In order to identify those who are economically disadvantaged and therefore eligible for JTPA, GRI staff use school lunch eligibility. Later, self-reported income levels were used. The problem has been that school districts and the JTPA system define "economically disadvantaged" at different levels, with the JTPA definition being more strict than the Department of Agriculture, which allows a higher income level for school lunch eligibility.

As directed by the State, the GRI is now requiring individual certification data for participation. Because the GRI uses eight percent set-aside money, only 75 percent of the participants must be JTPA income eligible. However, for the GRI to complete intake forms (for determining income eligibility) and certify more than 10,000 youth is, in the words of observers, a "management nightmare". The State and GRI have worked out a compromise which requires a one-page form for each youth with self-reported income levels to determine the percent of certification at that level. However, school staff and program administrators are unhappy with this additional paper work requirement. Responses of low-incomes families are often marked by skepticism. Moreover, GRI staff believe that many schools will elect not to participate in the GRI program if a similar program very has been adopted in the district's regular Chapter 1 program, for example, because of this additional paper work and sensitivities related to collecting income-level data directly or indirectly from parents or guardians.

A second barrier, which has only recently arisen, is a decision by the JTPA state office to fund the GRI on a three-month rather than annual basis. Observers note that such funding allocations create three to four times the amount of reporting, including justifications for subsequent quarterly funding. Such budgeting also creates funding anxieties on the part of participating schools and staff, which in turn, affects the nature and continuity of development plans and initiatives.

Another concern is the GRI telecommunications network, which allows GRI and individual teachers to communicate with one another. Administrative staff and superintendents have expressed concern that communications with their schools should be conducted through proper channels, especially when they relate to hardware problems which could have cost implications. Observers feel that such anxieties will be allayed, over time, as the effectiveness of the system for encouraging teacher communication (in resolving hardware/software-related problems) can be adequately demonstrated.

Coordination between the Office of the Governor, which has ultimate responsibility for the JTPA Title II program administered by Winthrop College and the South Carolina Department of Education, is also important. Increased policy coordination on such matters as eligibility criteria could resolve some issues. Over time, as the new Governor more clearly defines JTPA priorities and directions for the GRI program, greater coordination with the South Carolina Department of Education can be expected to occur. Both the Governor and the State Superintendent of Education are elected officials.

Success Factors

A number of factors have contributed to the success of the GRI program and technology use.

First, critical to the successful use of technology initially has been the leadership of at least two key individuals. Appointed in 1984, the GRI Director took the major leadership role in developing the computer-based instructional management and the CAI system, built around earlier manually-operated systems which she and other staff developed. In addition to dedication, she and other key staff brought to the development effort experience and technical expertise related to computer-based education. During the early 1980s, the other key individual (located in the Office of the Governor) played a leadership role in focusing the program on at-risk youth to provide them with remedial education for subsequent employment and to reduce dropout rates. These two combined leadership roles led to effective initial implementation and success.

Second, the lengthy planning and subsequent development, redesign, and expansion process related to technology use provided an opportunity for planned implementation of the program. Initially, this was facilitated by GRI's long-term funding commitment. However, as noted earlier, the lack of long-term funding continuation has created some uncertainty and related problems over the last few months.

Third, the type of technology configuration has also contributed to the success of the educational program, particularly in mathematics. The instructional management systems, combined with supplemental CAI, integrated effectively into an overall curriculum which can be continually updated, has been a positive component.

In addition, opportunities were provided for extensive orientation and training prior to implementation; training focused on the very specific systems that teachers would be implementing in new labs.

Ongoing technical assistance, through subcontracts with the Sumter Area Technical College, recently provided the necessary problem-solving support to staff; the GRI telecommunications systems also provided on-call assistance on an as-needed basis.

And last, the fact that the GRI is a state-wide initiative under the leadership of the Governor also has contributed to successful technology use. The GRI has implemented a state-wide purchasing arrangement with publishers and vendors which has resulted in discounts benefiting not only the GRI, but also participating schools that have elected to implement the system. Rather than individual schools having to evaluate software, the state-wide initiative provides the necessary economies of scale to justify a centralized software evaluation, mapping, and correlation activity which has been critical to the success of the program. Reliance on the State SAP testing program for designing the curriculum resulted in more uniform implementation of the program across sites.

Closing Comments

The GRI is an excellent example of how computers can be used in a cost-effective manner with a combination of computer-managed and computer-assisted instruction. It is a prime example of how JTPA eight percent set-aside funds can be used to implement a technology-based, state-wide effort creating opportunities for economies of scale which benefit local programs.

The potential replication of the system is very high on a state-wide basis for those states interested in state-wide JTPA programs. Moreover, a number of components of the system are currently available for use. For example, the six-volume set of software evaluations is available from GRI for $85. The computer-managed instructional math program has been adopted by a number of sites outside the State, in addition to 32 adopting schools within South Carolina. Some of the pilot demonstration/development efforts currently under way will, in the near future, likely become available for use in other JTPA sites for a reasonable cost through either associated vendors or the GRI. And current GRI staff, some school staff responsible for labs, and other individuals formerly associated with the program are available -- at a reasonable cost -- to provide technical assistance, training, and related support activities for implementing one or more of the components of the GRI program.

MILWAUKEE

Introduction

Below we describe the background information and describe the technology used in the Milwaukee PIC JTPA program.

Background

The turnaround in manufacturing, caused by the falling dollar, has begun to affect manufacturing in the Milwaukee labor market that has already adjusted to the service economy. Labor conditions are the tightest they have been in this decade, with an unemployment rate below five percent. As a result, according to the Milwaukee PIC Director, "Business is beginning to seek out JTPA programs". This is a phenomena of only the last three or four months. Another result is that "the cream" is gone and most JTPA enrollees require enhanced basic skills and workplace literacy to perform on the job.

The Director of the Executive Office for Economic Resource Development (EOERD) generally favors the use of technology for delivering service and permits arrangements to facilitate this use (see the discussion of OIC below). However, the SDA has little leverage to encourage this trend. If the results were truly overwhelming (i.e., providers using technology were demonstrably more effective in moving enrollees into jobs or better paying jobs), then the Director could gradually shift funds to those providers. The data he has seen on learning gains has convinced him that technology will be part of most successful programs that teach basic and vocational skills to youth and adults.

Examining the list of JTPA providers in Milwaukee supports this conclusion. SER and OIC, which are exemplary technology users, are the biggest contractors; the others include ITT (skill training for word processing), the Office Technology Academy, and PC Learning systems (automated bookkeeping). In the final analysis, the SDA must ensure that it serves the various groups and neighborhoods in Milwaukee and that the basic JTPA standards -- placement rates, cost per placement, and wage at placement -- are met. Job retention and career advancement, as well as achievement of basic skills, are only secondary measures.

The Milwaukee PIC

JTPA Title II(A) funds ($4.1 million) and Title II(B) funds ($2.5 million) are administered in Milwaukee County by the EOERD. Last year, EOERD also received $200,000 in six percent incentive funds. EOERD's staff of ten is responsible for program planning, contract management, flow of funds, financial and programmatic reporting, program monitoring, and staffing the PIC. The PIC has 11 private sector representatives and ten from the public sector.

The EOERD funds 49 separate programs operated by almost as many organizations; Goodwill, ITT, OIC, SER, and others run multiple programs. EOERD collects data in written form from these organizations and transmits it in electronic form to Madison for State data processing. The State's WIMS (Wisconsin Information Management System) then reports to the Federal government and returns management information to the EOERD. While the State system is reported to be not fully user-friendly, the local agency could not afford to keep their own automated system, which they used for MIS until last year. The EOERD now uses some Macintosh units for their own purposes and clearly would like the capacity, once more, to operate their own MIS.

Intake, assessment, and certification is performed by Careers, Inc. for the year-round JTPA program under a $446,000 grant from EOERD. This activity is manual; the Test of Adult Basic Education (TABE) is the assessment instrument.

Since program operators generally must take referrals from Careers, Inc., this organization has important influence over the providers' success (e.g., Careers, Inc. determines which provider will get the learning disabled enrollees). SER's door-to-door outreach must report to Careers in order to enter the system.

Description of Exemplary Programs

The Milwaukee OIC

(1) Background

During the current year, the Opportunities Industrialization Center (OIC) of Greater Milwaukee is running four programs for EOERD:

- Basic Education ($227,000);
- Occupational Skill Training ($227,000);
- VICI Construction Training ($125,000); and
- Summer Youth ($42,875).

OIC-Milwaukee has established the Learning Opportunities Center (LOC) as a wholly-owned subsidiary to provide basic skills education for the OIC operation in Milwaukee. The Milwaukee OIC operation must comply with the performance based on placement per dollar, but LOC is paid on a "potential-slot hour" basis. As long as LOC has an enrolled student, they are paid $7.70 per hour irrespective of attendance. Average attendance is about 60 percent. The overall concern with placement per dollar drives the OIC-Milwaukee to encourage the LOC to terminate those not attending. Dropouts are unlikely to be placed and, therefore, OIC's costs are maintained while placements fall. To avoid this situation, OIC-Milwaukee pressures the LOC to fill the slots with students who will advance and be placed in jobs.

(2) Description of Service

OIC's Learning Center was the first CCP site in Wisconsin, and the Center's Director is an important person in the CCP network, helping other providers to establish CCP and technology in their programs. JTPA is the Center's primary client, but they have other students from Milwaukee Public Schools (MPS) and from the State. These latter two contracts are approximately $70,000 and $100,000, respectively, bringing the Center's total budget to about $400,000.

The Learning Center is established in a refurbished movie house in the Black section of the city. Most of its clientele are Black, although some Hispanic and White students attend. The Center serves youth exclusively. The Center director is a strong believer in professionalism and uses a certified teacher to work along with an aide in each class. However, she pays her teachers about 15 percent less for a 12-month year than local schools pay a teacher for a ten-month school year.

The Center currently has the capacity to serve 39 students per session and runs three-hour sessions daily (currently, they have 97 slots filled). On this basis, the Center's potential income is about $8,000 daily or about $2,000,000 annually.

(3) The Technology

This LOC was a pioneer CCP site. The operation is a typical open-entry, open-exit CCP arrangement. It has both Apple and Computer Curriculum Corporation (CCC) equipment and courseware.

The fact that the "cream is gone" is beginning to impact the OIC Learning Center. The director is, as a result, beginning to investigate IBM's Principals of Alphabetic Literacy (PALS), an interactive videodisc program designed to teach the most basic literacy to adults. The key barrier is funding, and the director is looking to a foundation or other outside support for the $60,000 required to outfit a PALS lab. The first attempt will be to return to the Ford Foundation, which provided the initial funds to equip their CCP lab. Failing that, the business-community that supports the Milwaukee OIC will be asked to help.

SER Job for Progress

(1) Background

The importance of "having the right guy in the right place at the right time" is clearly illustrated by the SER experience. A decade ago, the current Director of the Information Center came to Milwaukee from South Texas to work for SER. After a few years he left to pursue his education in marketing at the University of Wisconsin at Madison. One of his last class assignments was to develop a marketing plan for a nonprofit or public agency. He chose SER and submitted his paper both to his professors and to the SER Director. Both recipients were pleased and the "student" was invited to return to SER to implement his plan. Currently, SER has a highly diversified client base; has moved into an impressive, newly renovated facility; and uses technology in a very sophisticated way.

(2) Program

SER is providing alternative education for the MPS, runs youth programs for Wisconsin's Social Development Commission (SDC); is negotiating with the State Department of Health and Social Services to work with welfare clients under the State's new welfare reform program; has contracts with the Milwaukee Area Technical College (MATC); provides training for some of the homeless on work relief; and has a number of private clients.

As a result of diversifying, JTPA funds are only about 40 percent of SER's income of $1.1 million, and JTPA clients are about 40 percent of the 500 served annually by SER. Based on this diversified income base, SER was able to negotiate a long-term lease in a newly renovated building in the Hispanic part of town. As described below, SER also seeks to sell MIS services to the SER network and others.

SER serves as a major resources to teach English as a Second Language, as well as serving some Black and White clients. The total client body is about 50 percent Hispanic, 25 percent White, 20 percent Black, and 5 percent other minorities.

SER also runs programs for senior citizens (Title V) and has ambitious plans for a day care center to serve children of enrollees, children of those placed by SER, and as an after school program for MPS. SER also intends to initiate a Family Learning Center at this site, as described below.

Technology

SER's experience with computer-based instruction began during CETA, using PLATO. IBM was one of the Friends of SER in Milwaukee and supported them with a grant of IBM typewriters to establish a program under the business plan that had been drafted. SER has now established a CCP program and is installing network IBM PS-25s in their Learning Center.

SER has evidently decided to make a major push with technology, both for delivering instruction and to serve the SER network and others. With assistance from a Department of Labor grant to national SER for workplace literacy, they are establishing a Family Learning Center (FLC) to serve both single parents and their preschool and school-age children. The FLC is expected to be operational in February.

Parents will be presented with PALS on IBM's InfoWindow system (two units are installed) and will have access to IBM PS-25s to do writing and other exercises in the PALS program. While the parents are learning to read, their preschool, kindergarten, and grade children will be using PS-25s in another room with Writing-to-Read (developed by the same person who developed PALS for adults). These PS-25s will be networked to a PS-

60 file server, along with the CCP Learning Center machines.

SER will provide a rich day care and after school program with technology-supported education for the youngsters, along with state-of-the-art training for parents and youth. Programmatically, SER will serve JTPA, the MPS, and State's welfare reform effort, and others on SER-owned hardware with a diverse set of courseware.

In addition to serving their own client base, SER wishes to market their growing capability to help other providers use technology to support instruction. Thus, SER is developing a capacity to help others implement computer-based and interactive videodisc-based curriculum, select appropriate course materials, and modify materials so that it can be tailored to local conditions and requirements.

Finally, the Milwaukee SER is using part of a DOL grant to establish a SER National Information Center. They have acquired an IBM 4381 with networking capacity to serve, through modems, SER affiliates and others who wish to buy a variety of services. Program tools include: (a) Professional Office System (PROFS); (b) an electronic mail, time management, and document search system that works with DisplayWrite 370 word processing; and (c) a user-friendly "application system" designed to help users create decision support systems. Users will be charged a combination of subscriber fees and utilization charges.

Major Barriers

Four important barriers to the use of technology are described below, along with the solutions found in Milwaukee. In addition to these specific solutions, there were two overarching reasons why these barriers were overcome. In both the OIC and SER cases, there was a "champion" for a vision in which technology played a part. In the case of SER, the vision was a diversified clientele and income base; for OIC, it was professionalism. Thus, technology was a tool, not an end in itself.

In both cases, there was support from management for the overall vision. That support provided time for the needed development processes. Both organizations also benefited from a supportive board and a supportive environment in the SDA. Both organizations had been operating in Milwaukee for a long period of time and have good working relationships with their respective national organizations.

The first major barrier was finding resources -- money, time, and expertise. In both cases, outside sources provided funds and expertise and connections with a network of other technology users. For SER, it was IBM and most recently, the DOL literacy grant through national SER. For OIC, it was the Ford Foundation and the Remediation and Training Institute.

Next in importance was a lack of flexibility -- barrier to using the resources to get the job of training effectively. SER and OIC were able to be flexible in the use of the equipment they obtained because the hardware was purchased without JTPA program funds. That is, they could increase the utilization rate by letting both JTPA and non-clients use the machines.

The third barrier was the lack of a set of performance criteria that measured progress against a realistic objective. Grade-level reading, for example, often does not correlate well with job performance. On the other hand, the placement per dollar criterion does not reflect competencies gained. Because their respective overall programs were strong, the technology-based programs at OIC and SER could stay alike in the placement/dollar environment. Paradoxically, the tighter labor marker may make it more difficult if the parent organization is forced to serve more of those who need lengthy training in basic skills. That is, as "the cream is gone", so is that pool that could be easily (and inexpensively) placed.

Fourth was the absence of stability in JTPA (or predecessor) programs or incentives to invest in a new way of doing things that required up front expenditures and promised delayed benefits after a difficult development period. OIC got around JTPA's lack of stability by becoming a premiere site for CCP with stable funding from Ford. SER diversified its client base. The next few years may indicate which was the superior strategy.

Success Factors

A variety of factors must come together for those who pioneer. "Serendipity" says one pioneer, but it also needed someone there to take advantage of the opportunity and a supportive management environment. "A dedication to professionalism" says another, but she too needed support and good fortune.

The "champion" must have the psychological and institutional capacity to take risks and do things differently than they have been done before. Risk-taking is not a hallmark of government programs in general and JTPA in particular. As technology becomes more and more familiar, the need to be a risk-taker will become less stringent, but it is crucial today.

The two successes had management support, a necessary but no sufficient condition for success. This support was partially achieved by the risk-taker's ability to bring in outside resources and/or funding. There must be resources that are not tied to day-to-day justification nor bound with detailed bureaucratic restrictions. The two successes had untied funds from a foundation (e.g., Ford) or company (e.g., IMB). A network for both technical and moral support (e.g., the CCP network) is also helpful.

Perhaps the most important element for success is a goal that the champion holds and that is shared by the organizational management. Technology should be seen as an important tool toward achieving the goal and part of the solution to a perceived problem, not an end to be sought by itself. Thus, OIC seeks PALS because their student body needs more basic literacy training; not the other way around. In Wall Street parlance, the organization must be market -- not technology -- driven.

Final Comments

Success requires patience to work out the bugs, the capacity to evolve with the technology, and flexibility.

These organizations (SER/IBM and OIC/RTI) expect replication to occur elsewhere in the JTPA system. There has to be some capacity for local modification to give the local operator a sense of participation, as well as to meet local conditions. Yet the basic technology configuration that is being tested in both organizations can be used again and again if the organization can find an outside, generally unrestricted, source of funds.

The important variables are the ability to obtain technical and financial support, the characteristics of the student body (e.g., limited English proficient or native Americans), and the degree and kind of independence sought. Buying into IBM moves the organization along one road for technology and software, but also provides room for evolution regarding objectives and evaluation. Buying into RTI moves the organization into a specific system structure for objectives (i.e., the CCP strands) but provides hardware flexibility and some ability to integrate new third-party software as it becomes available.

The configuration used in each of these two modes can be replicated and modified, but the constraints each present should be carefully evaluated.

GARY JOB CORPS CENTER

Introduction

Located in the foothills of central Texas, the Gary Job Corps Center is the second largest in the country, serving approximately 2,200 Corpsmembers. Education and training is provided in six areas:

- Automotive Trades
- Building Trades
- Construction Trades
- Manufacturing Trades
- Office Occupations
- Service Occupations

Established in the mid-1960s at the former Camp Gary Air Force Base, built during World War II, the Center has a tradition of stability and good community relations.

Since its creation, the Gary Job Corps Center has been operated by the non-profit Texas Education Foundation (TEF), which also operates Texas Job Corps centers in McKinney and El Paso. TEF has a staff of more than 700 employees involved in Job Corps activities. It has a special relationship with the national Job Corps office in that it operates the Data Center which collects data and reports on Corpsmembers and their placement for all of the Job Corps centers. Recently, several former TEF staff (with its blessing) recently established a firm, Data5, which has developed a Job Corps Management Information System (MIS), designed for use on microcomputers, which is similar to the MIS originally developed for use on a mainframe at Gary. Over the years, both the TEF and Gary have developed strong ties with the surrounding community, including the city of San Marcos which owns land -- used for an airport and country club -- adjacent to the 900-acre Job Corps facility. Over the last few years, the Texas Employment Commission (TEC) and Gary have also developed a cooperative relationship. The TEC, which is a major recruitment contractor and provides placement services for the Job Corps Center, has a full-time person assigned to a field office at Gary. The Gary TEC office has on-line access to the TEC state job bank. Gary Job Corps officials are active with the state, serving on the Governor's Task Force on Literacy, and have made numerous presentations relating to technology use at state and local education conferences focusing on computer use in education and training.

Administration

The Gary Job Corps Center provides comprehensive services for Corpsmembers, including room and board, health, education, training, recruitment, and placement. The Education and Training Division Director has been involved in Job Corps activities for almost two decades and has eight years of service at Gary. In addition to more than

130 instructors for occupational areas, the Education and Training Division has two vocational counselors, two systems analysts, and 20 additional staff who provide placement, special programs, and other support activities for the overall education and training program. The Education and Training Division has several facilities which are primarily dedicated to GED, reading, and math programs. Reading and math programs are also conducted in facilities which provide occupational training. All of the administrators at Gary have extensive experience in operating Job Corps programs, a factor which has contributed to the team approach used to solve the myriad of problems Corpsmembers bring to the Center when they enroll. Most Gary staff have had prior experience dealing with at-risk youth while they were in the armed services or with Texas public schools.

General Use of Technology

The Gary Job Corps Center was one of the first to use computers and related technology in its education and training programs. During the late 1970s, under the national Job Corps Education Improvement Effort (EIE), Gary served as a pilot site for the original PLATO system, which was used on a time-shared basis. Subsequently, the Center acquired lessons similar to PLATO which operated on the University of Illinois's Computer-based Educational Research Lab (CERL) "cluster program", which consisted of PLATO CAI lessons converted to operate on CERL equipment. In the early 1980s, Gary purchased a Honeywell microcomputer which is used in GED math and reading programs.

Computer technology is also used in occupational training, including business trades (e.g., data entry, typing/word processing) and other areas. Today, Gary has more than 100 computers and/or terminals.

The comprehensive Gary Job Corps MIS, developed several years ago by the TEF, was the first of its kind. The types of reports (required by Job Corps) which can be generated by the Gary MIS are:

- Corps Members Accountability System for anticipated arrivals and new arrivals, including various demographic data;
- Daily Accountability Morning reports, including Daily Status Reports, AWOL lists, probation lists, separations, AWOL letter to next-of-kin, among others;
- Various statistical summary and on-line reports such as Corps member demographic information, output by residential area and categories, and Corps member occupancy summaries;
- Performance Standards Reports, including reports on losses, summary statistics, and projections;
- Corps member Class Scheduling System, including class rosters, counselor schedules, and class assignment loads;
- Corps member Testing System, including TABE, progress

reports, schedules, and GED enrollment lists;

- Corps member Profile/Training Achievement Records, including training achievement records (TARs), progress rosters, profile records;
- Utility Update, including master course list, TABE, testing schedule, TAR element listing.

In addition to its MIS, Gary has on-line access, through the TEC field office, to the TEC state data base, which is used for two purposes: (1) assistance in job placement; and (2) conducting follow-up on placements three months after termination from Gary. This latter capability represents an early attempt by Gary to establish a program evaluation for assessing job performance and retention of its Corpsmembers after job placement. While Gary staff have considered accessing employment service job banks in other states, their priority to is ensure that Corpsmembers' resumes and other information is included in appropriate job banks prior to a Corpsmember returning to his or her home state. Plans are underway to formalize this process for Arkansas, Louisiana, Mexico, and Oklahoma, all of which are in the Gary Job Corps region.

The Gary MIS, and specifically the Corpsmember Information System (CIS), has an on-line capacity to provide information to, and access information from, the TEF Job Corps Data Center, which is maintained on the TEF Honeywell mainframe computer. Various types of information about Corpsmembers progress is reported directly to the Data Center, including weekly reports on TABE administration. The Gary Center has direct, on-line capability for updating student records directly with the TEF Data Center. The TEF is currently assessing the feasibility of direct, on-line linkages with other Job Corps centers around the country and to link the Data Center to the Army Finance Center, which is the payroll distribution center for Job Corpsmembers. The TEF-operated Data Center is also assessing (with various Job Corps screening placement coordinators) the feasibility of on-line access to the 200 plus recruitment and placement agencies under contract to the 106 Job Corps centers across the country. Approximately 30 Job Corps centers have installed the Data5 Job Corps MIS. This effort by Data5 is being supported by the national Job Corps office, even though no specific funds have been made available to centers for installing the system.

The use of computers in assessment and counseling varies and is determined after students are placed in programs. For example, when Corpsmembers enroll at Gary and receive the one- to two-week vocational selection program, the TABE is scored (with Scantron test-scoring equipment) and the results are sent to the Data Center. Later, when students are placed in reading programs, Job Corps screening and diagnostic tests for reading are computer-scored and prescriptions provided to teachers for student placement in the program. The Scantron equipment is also used with the Honeywell network software to conduct audit checks on TABE results before they are transmitted to the Data Center.

The program will detect whether a student has followed directions or had difficulty marking the responses heavily enough to be scanned by the equipment.

Description of Program

The objective of the education and training program at Gary, as in most Job Corps centers, is to prepare Corpsmembers for, and place them in, jobs. In addition to occupational training in the six cluster areas, Corpsmembers receive basic skills instruction and GED preparation services.

Corpsmembers receive a minimum of six months of training and related services, up to a maximum of 24 months (plus an additional four months, in certain cases, when waivers are provided). The length of training depends on the trade selected and the participant's rate of progress.

During the first two weeks, the Corpsmember receives orientation, including career counseling to select an occupational cluster, and various types of testing and assessment. Counseling and assessment rely heavily on the Picture Interest Exploratory Survey (PIES), an instrument which includes more than 160 slides of activities occurring in different occupational clusters which the member rates in terms of personal preference. With assistance from a counselor, the results are used to focus on specific vocational areas for each Corpsmember.

Each Corpsmember also takes the RJS (reading) and MJS (math) tests, described below, for initial screening purposes. Additional tests are administered for placement in specific math or reading program, as described later. In addition, the Corpsmember is also administered the TABE within a week after the RJS or MJS. Then, the TABE is administered three times during the year at each scheduled interview.

Once the Corpsmember is assigned to a vocational cluster, he or she usually spends half of each day in nonvocational subjects including reading, math, and (if appropriate) ESL supplemental programs. In addition, the member receives instruction related to the world of work, including basic skills related to his or her specific vocational cluster. Additional information and instruction is provided in such areas as cultural awareness and health.

Depending on the trade selected, the Corpsmember progresses to an intermediate vocational program for one-half day, at a minimum. At this point, if the member does not have a high school diploma or GED equivalency, he or she participates in a GED preparation program not tied to any specific vocational cluster. In addition, he or she receives health-related instruction (e.g., physical education), driver education if appropriate, vocational area instruction (e.g., crafts), and/or leadership training (up to one week) designed for Corpsmembers who become active in campus student government activities.

The Corpsmember then enters the advanced vocational training phase, which typically includes three-fourths of a day heavily involved in vocational cluster training. In many instances, the Corpsmember may serve as an aide to the instructor.

Usually one week before being assigned to work experience activities, the Corpsmember receives advanced job orientation focusing on specific skills required for holding jobs. Upon completion of this phase, the Corpsmember serves approximately six weeks in a work experience environment, usually provided by a local employer who treats the Corpsmember as an (unpaid) employee.

During these latter two phases, Job Corps and TEC placement specialists work with Corpsmembers to provide placement services.

Description of Computer Use

Computer-based instructional delivery has existed at the Gary Job Corps Center since the early 1980s. The EIE pilot program used the PLATO CAI lessons to provide GED, as well as basic math and reading instruction, on a time-shared basis. PLATO hardware and software were provided to Gary for the pilot program by the national Job Corps office. After the pilot program, Center staff decided the on-line telecommunications costs for the PLATO system were not affordable and, hence, acquired the "cluster system" which included several hundred PLATO lessons. Through the efforts of CERL and Gary, more than 130 lessons were converted to operate on the CERL system, which consists of 28 CDC terminals tied into a Motorola (EXORACS) computer with a hard disc. This equipment is being used in GED preparation, reading, and mathematics programs.

In addition to the cluster system and CDC equipment, Gary currently has approximately 20 ADDS terminals committed to the Honeywell minicomputer, which is used for both instruction and MIS.

Program Impact

The impact of technology use at Gary has been both multifaceted and variable over time. When the PLATO on-line program was used in the GED program, class sizes were increased from 15 to 25 students, with between 95 and 98 percent of the Corpsmembers successfully passing the test the first time. According to staff and observers, CAI lessons have been most effective in preparing limited English proficient participants -- particularly Hispanics and Asians -- for the GED. A 1984 evaluation of the CAI/CMI program, conducted by Center staff, reported additional impacts which are indications of improved instructional programs (NCEP, 1985):

- increased student time on task as a result of increased student motivation and ability to measure success in discrete skill development.
- a 60 percent increase in the number of students served per

year, particularly in the GED program;

- creation of an environment in which students proceed at their own rates and become motivated to succeed; and
- increased teacher-participant contact time as a result of the computer-managed instructional system.

The specific impact of computer-based instruction is difficult to ascertain from existing records. Only recently have Gary officials been able to track the number of hours of computer-based instruction students receive. Moreover, because of the lack of hardware, less than 50 percent of members who participate in the GED reading programs have access to computer-based instruction. The recent education report for Gary indicates that the average entry-level grade is 5.8 for reading and 6.2 for math. In reading, members average over one month gain per month in the program, and in math almost two months gain for each month. Approximately 75 percent of the Corpsmembers at Gary are placed. Slightly more than 80 percent of Corpsmembers eligible (i.e., academically prepared) for the GED passed the test.

GED Program

The GED program is not integrated into or operated physically in the occupational cluster sites, but rather in three nearby facilities. Twelve of the terminals used in the GED program are tied to the cluster program while five terminals are linked to the Honeywell computer. Ninety-five percent of the cluster programs' CAI lessons were developed by the CERL, with the remainder developed locally by Gary staff. Most of the GED lessons on the Honeywell were developed by Gary staff. In addition to the above equipment, three Apple computers are available for use in the GED program. Gary staff have access to some of the same software that has been purchased by the national office for use in the ten sites involved in the CAI evaluation project. Commonly used titles include "Oregon Trail", "Where in the World is Carmen San Diego?", and others. The Gary GED program is undergoing some significant changes as a result of the new GED test which is being administered beginning in January 1988.

Currently, there are approximately 12 CAI lessons for each of the five GED areas (grammar, social studies, science, math, and reading). Gary GED teachers -- who were involved in reviewing software for the CAI evaluation project -- expressed their desire to use new software titles in the GED program; however, because of the lack of funds, not enough hardware is currently available. A Gary staff member is on the Job Corps GED Advisory Group.

Reading

As described below, the most innovative use of technology at Gary is in the reading program, which uses computers for both direct instruction and instructional management, including scoring of tests using Scantron equipment. Approximately 40 CAI lessons, developed by Gary staff for use on the Honeywell network, are used extensively for drill-and-practice and tutorial purposes. They are designed to motivate students through the use of high-interest material and build upon situations related to Corps life at Gary. Computer responses and questions are designed specifically for at-risk youth living in Job Corps environments. In addition to the locally-developed programs, approximately 70 CERL CAI lessons are used extensively in the reading program.

Some of the most extensive users of the CAI programs are the 200 plus Corpsmembers who have limited English proficiency, including Hispanic Americans, Mexican nationals, and Asians, among others. Instructors believe that the primary advantages of CAI with these populations are: (1) the computer's infinite patience to administer repetitious lessons; and (2) the lack of stigmatization and intimidation often associated with teacher-provided instruction.

In all instances, the CAI system is used to supplement the traditional print and other materials included in the Job Corps reading program manual, which all Centers must follow. Integration of CAI into the Job Corps' reading program was facilitated by an instructional management system developed by Gary staff five years ago. For the typical Corpsmember, the RJS-1 screening test (reading) is administered during orientation, along with the JCRP. Information from these two tests is provided to the reading program staff, who in turn determine which level of diagnostic test is to be administered to the students for placement. Once administered, the diagnostic tests are scored automatically. Class assignments are then keyed to specific lessons plans for the Corpsmember and printed on DEC writers.

In addition to the instructional management system, Gary staff also developed software to interface with the Center MIS. This set of software routines allows the staff to monitor student progress on a weekly basis and track student flow on an hour-by-hour basis. This system was developed in response to a need for improved student tracking to relate student progress to time on task.

The reading program at Gary is one of the most innovative in the Job Corps. Integration of CAI lessons is facilitated by the instructional management system which prescribes lessons and activities at a much more specific level than such other widely used instructional management systems as the CCP.

Math Program

The math program at Gary, located in two facilities, has approximately ten terminals. Four terminals are linked to the cluster program while five terminals are on the Honeywell network. The CAI lessons are a combination of those developed by CERL and Center staff.

The CERL CAI lessons used in Gary are very similar to the PLATO math program used in the EIE project during the early 1980s. CAI lessons cover such traditional math curriculum as fractions, decimals, ratios, geometry, and measurement. Supplementing the CERL lessons are approximately 40 CAI lessons (basically drill-and-practice) developed by Gary staff. The content of drill-and-practice CAI lessons is designed to relate to Corpsmembers' experiences at the Gary Job Corps Center, and occupational areas that Corpsmembers will likely experience after being placed on the job. These drill-and-pratice lessons cover such topics as whole numbers, fractions, and measurement.

Unlike in the reading program, the math program does not use computers for instructional management to diagnose Corpsmembers' strengths and weaknesses or describe individualized lesson plans. However, prior to being placed in the math program, Corpsmembers who take the MJSI (initial screening) and MJS2 (placement) tests have their tests scored by Scantron's equipment interfaced with the computer.

The Gary Center education and training staff have considered developing a math instructional management system similar to that in reading. However, they have postponed development for a number of reasons, including: (a) inadequate staff resources; and (b) limited benefits of such a system because they would have to use outdated equipment. They would prefer to purchased and/or adapt such an instructional management system for use on newer equipment, when and if it becomes available.

Occupational Training

Gary has attempted to integrate basic skills into occupational training. Computer-assisted instruction is used to supplement regular Job Corps reading materials in these occupational areas.

One prime example is the data entry trade skills areas, where approximately 16 terminals, tied into the Honeywell, are used to provide data entry training. Intermediate level students who need to improve reading skills prior to continuation in the data entry program can do so in the reading lab, or can use supplemental CAI software on five MS-DOS machines in the data entry facility. Some of the software packages used in this program are those published by Electronic Arts, McGraw-Hill, Southwest Publishing, and Steck-Vaughn. In several other occupational cluster areas, Corpsmembers can access reading lessons, available through the Honeywell, to improve reading skills, while they are concurrently receiving vocational training. While computers are not currently used in the world-of-work programs, instructors have modified the basic world-of-work program to use terminology, skills, and activities from specific occupational areas which are the focus of world of work orientation and job preparation activities.

Barriers

At Gary, there are two major barriers to technology use.

Funding

Through the EIE project, the Center was provided PLATO hardware and software. However, due to the high online data transmission and telecommunications costs associated with PLATO (lessons were available only through telephone lines to CDC in Minneapolis) and the lack of national funding to cover this cost, at the completion of the project Gary was forced to adopt the cluster CAI lessons which CERL was willing to convert.

Funding is a major problem constraining the purchase of new computer hardware. While the TEF contract covers many operations and maintenance costs, capital equipment funds are allocated to centers at the national/regional level. Periodically, the Job Corps conducts facilities surveys and, based on relative needs within a region, allocates funds to "capital equipment". It is extremely difficult to get approval for computer and related technology equipment purchases when other equipment (e.g., bulldozers), facilities refurbishing, and other higher priority requirements exist. As a result, instructional equipment usually receives a lower priority in the budget allocation process. Moreover, Gary equipment priorities change because of advances in technology or breakdowns in existing equipment. The reprogramming process could be very time consuming and, in many cases, serves as a disincentive to changes in computer-related equipment.

In an attempt to overcome this problem and obtain funding support for technology in the future, Gary officials have attempted to identify more clearly their needs and justifications to ensure that such needs are clearly stated prior to funding allocation decisions at the regional DOL office.

Obsolete Equipment

The cluster system design is more than five years old. Although the hardware is only three and a half years old, it suffers from hardware obsolescence and increased maintenance and repair costs, which put a significant strain on both teachers (frustrations related to equipment down time) and support staff (who are responsible for maintaining the equipment). Use of obsolete equipment has presented a problem for Gary staff. Few new software packages are available for existing hardware; so Gary staff continue to develop CAI lessons while realizing that their use will be limited because of hardware obsolescence.

Because of high equipment downtime, costs and staff time associated with maintenance and repair have increased dramatically. Some of these costs are being covered by the department responsible for MIS. As a result, fewer and fewer terminals networked within the MIS are being used for instructional purposes since "he who pays the bill gets the priority."

Given these problems, Gary officials are considering a variety of alternative approaches to overcoming them. First, education and training officials have attempted to design a new facility to minimize operating and related costs (e.g., air conditioning, security system, wiring) of computer-based delivery systems. By doing so, they hope to reduce the overall investment needed for technology.

Second, officials have contacted the General Services Administration, hoping to identify surplus equipment which could be used to replace existing, obsolete equipment. Third, discussions have been conducted with University of Illinois (CERL) to assess the feasibility of further lessons development and conversion of CAI lessons. The use of CERL's NovaNET, which distributes PLATO lessons via satellite, has also been discussed. While this alternative could result in the use of familiar and proven CAI courseware, it would require the purchase of new hardware because CERL no longer supports cluster hardware.

Success Factors

A number of staff characteristics have contributed significantly to the program's success and its effective use of technology. Gary staff are very knowledgeable about Job Corps' basic skills programs and have a wide range of experience and expertise. Of the administrative staff, most have had between 15 and 20 years of experience in Job Corps center operations across the country and virtually all key staff have been at Gary for the last ten years. Moreover, key administrators are experienced teachers and keep abreast of current developments in the use of technology and basic skills instruction. As a result of this in-depth staff experience and expertise, program administration is relatively informal and based on team work with significant administrative support. Considerable fexibility is allowed for experienced staff to experiment and modify programs to meet their own or Corpsmembers' specific needs.

Staff are dedicated, not only to Job Corps programs, but also to the appropriate use of technology. Staff are encouraged to participate in experimental efforts which are considered important in personnel evaluations. Currently, Gary staff: (1) are involved in the national GED Advisory Committee, which is redesigning Job Corps programs to meet requirements of the new GED test; (2) have participated in the development and field-testing of the culinary arts training manual; (3) have recently assisted in the validation of a reading program for a major publisher; (4) have participated in numerous experimental control studies funded by the Job Corps, including the Educational Initiative Effort; and (5) have taken an active role in developing the courseware evaluation form and conducting software evaluations involved in the design of the CAI evaluation project.

Key Staff Roles

Gary staff have played roles over time which have resulted in an expanded and more effective use of technology in their education and training programs. During the early 1980s, the administrator of the program served as an advocate for appropriate use of technology and encouraged staff participation in national Job Corps experiments and the development of CAI lessons on the Honeywell equipment. While this leadership at the highest level has not waned, the nature of problems has created a need for additional roles which have been largely filled by the Director of the Computer Learning Center. This individual, who has considerable programming expertise, assists instructional staff either by customizing lessons to fit better into their programs or by developing "gap filling" drill-and-practice and other lessons at the request of individual instructors. Over time, this individual has also been responsible for trouble shooting obsolete equipment to minimize down time, particularly since the vendor (CERL) of the cluster system no longer provides direct system support. This trouble-shooting role has increasingly become critical as two or three terminals typically "crash" each day; there would be even more frustration, if it were not for his timely repairing of equipment. This individual has also taken the initiative to develop programs which will allow the education and training staff to access the overall MIS and use existing data more effectively for student tracking and program evaluation. This individual also continues to develop simple drill-and-practice lessons when a need is perceived. This individual is, of course, also responsible for operating the Computer Learning Center.

Special Relationships

Another factor contributing to the success of Gary's programs and, in certain cases, the use of technology is the special relationships it has developed with other key groups. Due to Gary's willingness to participate in Job Corps pilot demonstrations and experiments, it has received a great deal of free hardware and software. The Texas Education Foundation, which operates Gary, has a unique relationship with the national Job Corps office in that it currently operates the Data Center for all Job Corps centers. Even though Data5 is a separate company, it remains closely associated with TEF and enjoys a unique relationship with the national Job Corps office, which encourages other centers to establish management information systems. The Center has also developed a special relationship with the Texas Employment Commission, which has a staff member physically located at Gary. These relationships, developed over time, are based on mutually beneficial arrangements which have contributed to an environment in which financial and other support, including expansion of computer-based activities, has been provided at critical times.

Closing Comments

One of the lessons learned from the Gary experience is that there exist a price associated with being an innovator. Gary was one of the first centers to use computers in education, as part of the EIE pilot demonstration, through which it was provided free PLATO hardware and software. However, because funds were not available to defray data transmission costs, Gary was forced to adopt a reconfigured version of the PLATO system which is no longer supported by the vendor. Maintenance and repair problems have drained Gary staff and budgets; existing commercial software, which Gary staff would like to use does not execute on their outdated hardware. On the other hand, were it not for the EIE demonstration project, funding constraints may have kept technology use at Gary at a lower level than it is now.

Another related lesson is that staff who are dedicated and have the necessary expertise can make maximum use of equipment, even if it is obsolete and incompatible with current software. Moreover, a persistent staff dedicated to the appropriate and effective use of technology can harness the resources and expertise to expand the use of computer for both instruction and instructional management.

Gary staff have identified a number of design features of computer-based configurations which would be most effective in a Job Corps setting, including:

- an instructional management system with the capacity to diagnose and prescribe lessons in an automated manner, track the individual progress of students, and provide access to the general MIS; this would reduce staff time and paper work burden and would increase student contact time;
- network configurations which are open and provide opportunities for vendor, as well as third-party, software to be integrated and used on the network; this would reduce software costs through licensing arrangements, and allow staff to update the program as new software becomes available;and
- commercially-available software which lends itself to individualized, student-directed instruction and can be correlated, on a lesson level, with Job Corps reading and math program manuals.

Replication of the Gary instruction and instructional management software in its current form would be difficult because of the lack of vendor-supported hardware. Several components, however, could be replicated for use in other centers or elsewhere. For example, the reading instructional management system, which operates on Honeywell hardware, would only require the development of appropriate documentation for use elsewhere. With minimal funding support, Gary staff argue that the CAI reading lessons could be converted to operate on other hardware.

While the cluster CAI lessons are not available for commercial, stand-alone hardware, CERL has established NovaNet, a satellite-based telecommunications system for distributing the cluster lessons to remote locations. Approximately 200 cluster lessons and an additional 1,500 former PLATO lessons, many of which were used initially at Gary, are now available for distribution through NovaNet. Indeed, CERL officials recently met with the DOL national Job Corps office to discuss the possibility of testing NovaNet in one or more Job Corps centers. Due to the recent development of NovaNet, the feasibility of this approach is worth assessing.

PHOENIX JOB CORPS CENTER

Introduction

The Phoenix Job Corps Center, established in the late 1960s, is located in downtown Phoenix, with five sites throughout the city. In the central administrative office, the computer-based math and reading program -- the focus of this study -- is operated. Occupational training programs occur in four annexes. Phoenix is somewhat unique in that approximately half of the Job Corps members are residential -- two facilities have dormitories for Corps members -- while the remaining live in the area.

The Center is operated by the Teledyne Corporation, which was the initial contractor. Teledyne also operates additional centers located in Tucson (Arizona), Gainesville (Florida), Jacksonville (Florida), Alburquerque (New Mexico), and Pittsburgh (Pennsylvania). Teledyne has operated additional Job Corps centers over the last two decades. Observers noted that the Phoenix Center is the "showcase" of Teledyne's centers.

The Phoenix Center has a contracted capacity of 415 Corps members. Of the 420 currently enrolled, approximately 25 percent are Caucasian, Mexican American, or American Indian, with the remainder Black and Asian. Between 15 and 20 percent of the Corps members have limited English proficiency. Over the last five years, the number of Asian Corpsmen has increased rather dramatically, as the Center has developed a reputation for serving this population very effectively, especially in the electronics assembly training program.

The Center administration has recently been decentralized to 16 separate departments; it provides training in 11 occupational areas, the largest of which is electronics assembly, followed by health occupations, business and clerical, retail sales, and word processing. Members involved in the building and apartment maintenance, carpentry, brick-laying, plastering, masonry, and painting trade training areas are receiving on-the-job training in a three-year project to build a new center dormitory.

The programs are administered by a Center Director and an Assistant Center Director, with 16 years of prior experiences at Phoenix, who is responsible for all programs. Within the central office is an executive secretary, an administrative assistant, employee relations administrator, Center standards officer, and specialist for placement, records, and recruitment. The Center is responsible for all of its placement and recruitment functions and does not rely on outside contractors or other public agencies. The Manager of Basic Education Programs, under the Assistant Center Director for Programs, supervises 18 staff, 15 of which are instructors, including four for reading, three for math, two for GED, and one each for driver's education, health education, special programs, and cultural awareness.

The Assistant Center Director, Manager of Basic Education Programs, and Special Programs instructor have approximately 45 years of experience in operating the programs at Phoenix.

Program operations at Phoenix are similar to those in most other Job Corps centers. The student intake process begins with assessment and counseling, followed by a combination reading and math instruction concurrent with vocational training, followed by more advanced training and job preparation activities, with work experience provided with local employers where possible. Unlike most other centers, as described later, the computer-based math and reading programs are in a separate lab facility rather than being integrated into occupational cluster training areas. Unlike other centers, Phoenix also provides an advanced math program, particularly for college-bound youths, many of whom have limited English experience.

General Use Of Technology

Computer-related technology is used extensively in the Phoenix Center for both management and service delivery purposes. Below, we describe the use in MIS and then some of the unique applications used in math and reading instruction.

Management Information System

During the early 1980s, as Phase 2 of the Education Improvement Effort (EIE), the Center obtained the BTI 5000 system, which is a mainframe computer network configuration and "simple" management information system. Center administrators felt the need to develop a much more extensive and comprehensive MIS, which they did by hiring a part-time undergraduate student who developed the MIS program over a three to four year period.

The BTI 5000 is connected, via cable and telephone lines, to remote sites in both the Phoenix and Tucson Job Corps Centers. Data is entered, retrieved, and printed at these sites.

The data-based systems programs are managed by the system itself. Data structures are defined in the data dictionary and are accessed by all programs, rather than defining within programs themselves. This allows changes to be made to the data structures without requiring software alternations, and new systems can be created without reprogramming. The menu, for exampie, will adjust to program additions and deletions without the program itself needing to be revised, thus saving valuable programming time.

The Corps member data base includes 32 programs which can be used for various types of report generation. The Corps member master record includes 32 data elements, ranging from Social Security Number to specific staff to whom he or she is assigned. While the MIS is used extensively to develop reports and/or data for transmission to the Job Corps Data Center, more critically it is used extensively by the Center directors and the 16 decentralized departments. As a result, a number of custom reports can be generated from the data bases within the general MIS. These include attendance reports for each of the clerical area, class loads, dormitory head counts, the instructional management system reports used in the math program (discussed later), and performance management reports, among others.

In addition to the general MIS data bases and the customized reporting, staff in the basic education program have developed numerous additional programs for accessing, manipulating, and reporting data within the MIS. For example, using a multi-plan package, the Manager of Basic Education Programs can generate reports on Corps members which include termination dates, math and reading gains, and GED-related information and can use this information as a means for evaluating programs. Information is also provided to counselors and instructors, who can assess the progress of their members. In addition to administrative use by the manager, instructors use general MIS and customized reports for a variety of purposes, including attendance, scheduling, etc. Within the Basic Education Program, seldom does one see a staff person or instructor from one office going to another without a piece of paper which, in the vast majority of cases, is a computer printout generated by the MIS and/or interface program.

The MIS is so integrated into program areas and used extensively by program staff that it is difficult, in many cases, to separate the MIS functions from the service delivery functions. This will become apparent in the discussion of computer use to score tests and generate reports and the math instructional management system.

Center staff are planning to replace the existing hardware which was purchased over eight years ago, but will continue using the MIS. This will most likely require extensive reprogramming and other conversion activities. Staff feel that this alternative will be very cost-effective in the long run because of staff familiarity with the existing system and its capabilities.

Reading and Math Programs

The focus of this study is the reading and math computer lab, which uses a variety of hardware and software, much of which has been developed for instruction and interface with the general MIS.

The computer lab is operated by the Special Programs Instructor, with assistance from a Testing Coordinator. Aside from being operated as a separate lab (rather than being integrated into occupational cluster training), the program is operated in accordance with the general Job Corps manuals, guides, etc. Practically all Corps members receive some instruction in either math or reading, depending on identified needs. With open-entry/exit and a self-paced schedule, participants may receive instruction for brief periods of time, exit the program, and then come back for specific skill-building, test review, or other purposes.

The Special Programs Instuctor, a former GED preparation teacher, has been with the Job Corps for 19 years. Although his formal education is in English, he has become extremely active in mathematics content areas. After being appointed to his current position, he developed programming skills and has become the primary instructional program developer. Currently, he is on sabbatical to the national Job Corps office to provide a number of services, including: (1) using WordPerfect to develop a program which maintains the Job Corps Math Manual, to improve ease of updating; (2) rewriting the Job Corps Math Supplement, replacing an older version; (3) developing additional forms for Job Corps tests for metrics; and (4) conducting a needs assessment related to instructional management needs among Job Corps centers. He also serves on the GED Advisory Committee, which is recommending various changes in Job Corps GED programs to be consistent with the new GED test. He and the Manager of Basic Education Programs participated in the national CAI Evaluation Project by evaluating software and providing training to several sites. Their participation in these projects is one indication of the respect that the national and regional Job Corps offices have developed for both of these individuals.

In addition to the services key Center staff individuals have provided to national and regional Job Corps activities, Phoenix has a long tradition of participation in projects supported by the Job Corps. For participation in the EIE project during the early 1980s, central administrative, as well as educational, staff were provided the stand-alone PLATO system, and they received additional financial support for the purchase and implementation of the MIS.

For a variety of reasons, as described later, Center staff purposely established a separate computer-based lab for math and reading instruction. Numerous interfaces have been developed with the MIS and various means of coordination exist between administrative staff and the training instructors and counselors.

Innovative Technology Applications

A number of unique applications and uses of technology are used at the Phoenix Center, particularly in the reading and math laboratory.

(1) Job Corps Math Management System

One of the most innovative programs is the Math Management System developed by the Special Programs Instructor in 1984. The current system operates on the BTI 5000 network and is interfaced with the overall MIS.

The Math Management System allows scoring of all 148 tests in the Job Corps Math Program (which consists of print and audiovisual materials, lesson plans, manuals, and other components) through an interface with Scantron test-scoring equipment. For the MJS1 (math screening test), it checks the tests and prints out the score with other scores from the same testing group. For the MJS2, it checks tests and responds with scores and appropriate diagnostic test to be taken. If a person fails the diagnostic test, the system responds with the score and code for the appropriate assignment checklist. For a failed unit test, the system responds with the score and a listing from the Job Corps Math Skills Directory of each item type missed, including the number of questions missed. Each entry includes a written description and example and a list of materials from which an instructor may select a remediation assignment. The system also allows instructors, counselors, and other staff to access the system and obtain the following types of reports: (a) Update Test Records; (b) Update Skills Directory, which allows the user to change the data in the Skills Directory; (c) Test and Scoring Diagnostics, which allows the user in input marked Scantron answer sheets; and (d) Change Item Type Code, which allows the user to change an Item Type Code without losing the data stored under that code.

The instruction program uses 12 Commodore 64 microcomputers, some of which are networked for use with Speed-Check, described later, and an Apple IIc.

In addition to the Apple-compatible software included in the CAI evaluation project, the Center has purchased from a major software publisher (Gamco) an extensive array of math drill-and-practice programs and has access to several hundred public domain Commodore programs. Prior to the purchase of the Commodore configuration, drill-and-practice math lesson plans were developed by the Special Programs Instructor for use on the BTI 5000 mainframe network. The mainframe terminals are now used primarily for MIS purposes.

(2) PLATO Reading and Testing Program

Through the EIE project, the Center received three CDC 110 microcomputers, which were initially used to teach reading in the pilot program. More than 800 lesson plans were available at that time. The CDC microcomputers and PLATO system were used primarily to teach certain reading skills and provide major test review functions for Corpsmembers. Virtually all of the limited English proficient (LEP) Corpsmembers initially receive Disc 1, designed for elementary reading (i.e., 30 lessons that focus on word reading and progress to higher level reading skills). A student in GR (grade) level 3 might start on Disc 1, while a student in GR (grade) level 8 might start on Disc 10.

About 70 percent of PLATO use, however, is for test review. For example, if a Corpsmember takes the GED test but does not pass, the teacher usually refers the Corpsmember to the lab, where he or she receives additional test review and drill-and-practice instruction. After a Corpsmember has been in the reading program for 60 hours, he or she is usually assigned to the PLATO program for test review and drill and practice.

The reading program does not have an instructional management system like the Math Management System described above. Although the regional DOL Job Corps office has suggested that the Center develop an instructional management system for reading, Center staff have been hesitant to develop such a program for use on current equipment because of expectations that Center hardware may change in the near future.

(3) Speed Checks

In 1985, the Special Programs Instructor developed a "speed check" program for the Job Corps math program. Speed checks are used extensively in Job Corps centers across the country as confidence builders and a means of accelerating slow work habits. The speed check program operates on the Commodore 64.

The computer program has improved the administration of speed checks by scoring the drills and maintaining necessary records. The software has the following features:

- students use a joy stick to interact with the computer, thus not requiring keyboard skills;
- the program can be used by nonreaders, requiring nonverbal directions;
- the program stores test scores on each drill level -- the number of times the drill has been done and the date of the last drill;
- motivational features such as music and graphic displays, are built in;
- the program is networked for simultaneous use by up to eight students; and
- the program provides multiple forms -- up to 4,000 different forms

(4) TABE Scheduling program

The TABE is administered at the Center every 90 days. As well as during initial assessment and counseling. Center staff have developed a scheduling program for the administration of the TABE program. The scheduling program generates a memorandum for each Corpsmember, indicating the time and place he or she should take the test, how long it will take, and notes that the Corpsmember's paycheck will be withheld until he or she completes the test. It provides reports for staff indicating the Corpsmember's TABE status and the number of timeshe or she has taken it.

It also provides summary reports of Corpsmembers' TABE gains and can provide reports for Corpsmembers who took tests on specific dates, indicating percentage gain or percentage loss, total gains, average gains, detailed analysis, etc. by individual departments and by individual staff. These reports are maintained on a data base which is used extensively by the Manager of Basic Education Programs.

In addition to TABE reporting, the Center has developed and uses extensively a program for scoring TABE results, using Scantron equipment. For each Corpsmember who takes the TABE, the system reports scores for each level of math computation and reading comprehension in grade equivalents and percentile rankings and presents detailed analyses which can be used by staff to focus on specific areas of weakness. This system provides a printout to each counselor and instructor to proscribe additional materials for Corpsmembers to remediate deficiencies identified on the TABE. Staff believe that such a test scoring and reporting system is necessary to provide immediate feedback both to the students and to the counselors/instructors; it also provides the administration with useful information in assessing the relative effectiveness of the math, reading, and GED programs.

(5) IBM PALS Program

Beginning in January 1988, some Corpsmembers are receiving instruction on a 14 work station IBM PALS configuration, which includes both microcomputers and videodiscs, using the IBM InfoWindow. Job Corpsmembers are assigned instruction for two and one-half hours per day, three days a week, for eight weeks. For the most part, Corpsmembers who receive this instruction are those with low entry level reading skills, including a large number of LEP students. The cost of instruction to the Center is virtually zero. Center staff have to pay for transportation costs to and from the PALS site and pay for a disc to accompany the student.

Benefits of Technology and Planned Changes

Center staff and observers attribute a number of impacts to the various technology applications used in Phoenix. Member's monthly gains in math are approximately twice as high as the national Job Corps average. Staff note that these scores are understated because the older version (i.e., pre-April 1987) of the TABE was not sensitive to gains by students who enter the program with relatively high entry reading levels. Most Phoenix Center Corpsmembers have high entry reading skills and tend to "top out" on TABE reading scores.

In addition to technology's impact on student achievement, a number of other positive effects have been noted by Center staff, including:

- computer-based, self-placed, and student-directed instruction in the math program is not only educationally sound but also motivates both students and teachers as they can see the progress being accomplished; this, in turn, enhances student self-esteem;
- the math management system allows for greater student output, increased student-teacher ratios, and increased time for teacher- student contact as the system reduces paper work and administrative time; increased teacher-student contact time is frequently associated with improved student achievement;

- increased student time-on-task is also attributed to the use of the computer-based drill-and-practice program used in the management system; time-on-task is an important instructional variable; and
- the management system and adapted MIS programs permit effective coordination between the education staff and the occupational training instructors and counselors.

Several minor problems were also identified. Center staff who wish to introduce higher order thinking skills software into the math and reading program believe that it would be difficult to do so without the development of a reading instructional management system. They also expressed concern that there is a tendency to teach only those minimal competencies outlined in the Job Corps manuals, which have not been updated over the last ten years. They also believe that if the entire TABE battery could be used (Job Corps allows the use of only two components), this would encourage introduction of higher order thinking skills. They believe that the inclusion of critical thinking skills on new GED will encourage future use of CAI tutorials and simulations.

On several occasions, Center staff have had problems getting permission from commercial software publishers to modify their software for use in the math management system. Some publishers produce software to operate only on stand-alone microcomputers and refuse to publish network versions which could reduce copyright protection and, hence, sales potential. Should the Center network all of its Commodores, some publishers may be hesitant to allow them to use certain software packages on the network.

Since changes for the immediate future revolve around the MIS Center, education staff believe that the funds allocated to the acquisition of hardware and the development/conversion of the existing MIS software will absorb any excess dollars, limiting possibilities for upgrading the technology used in math and reading programs. On the other hand, the staff were encouraged that some opportunities for using CAI in the GED program may be created as a result of the new written communications and critical thinking domains that have been added to the GED test.

If Center staff had adequate funding, one of its first major changes would be to purchase a network with a large hard disc capacity to link all of the Commodore 64 computers. They would also like to purchase or develop a comprehensive instructional management system which could be used on a network configuration. Most staff believe that an instructional management system, linked to the MIS, is important because it could reduce staff requirements and minimize duplication of data entry. The staff also expressed great interest in the use of interactive videodisc programs, such as the "What's next?" program which is being reformatted for use on the IBM InfoWindow. Future decisions will depend on the results of Corpsmembers' use of PALS.

Barriers to Technology Use

Certain barriers to technology use have occurred at Phoenix, but key staff were successful in turning some of these problems into opportunities for expanding the use of technology.

First, the BTI mainframe's instructional component relied heavily on the MIS, which often received administration priority. Instructional staff were able to convince central administration that the BTI terminals could be freed up for use in MIS activities if the Center would purchase the Commodore computer lab.

Second, funding to acquire instructional hardware had been difficult to obtain because instructional equipment competes with much larger industrial equipment purchased in the budgetary approval process. However, staff have been able to obtain instructional equipment through participation in such projects as the EIE or to obtain discounts through State bids and/or corporate discount programs or otherwise obtain access to instructional technology used in such other projects as PALS.

Third, staff resistance to using computers for both MIS and instructional purposes has dissipated as individual staff saw the benefits accruing to them personally (e.g., reduced staff time, paper work,) and to participants. Moreover, Center staff believe that self-training not only is extremely effective, but also develops a sense of ownership which will result in effective and appropriate use of the technology. Therefore, the Center has not provided extensive in-service training, but rather allows ample opportunities for self-training or individual tutoring by knowledgeable Center staff. The creation of the Center's instructional computer laboratory also minimized the need to train all occupational instructors in computer use; rather, only the two staff who operate the lab required training.

Fourth, a lack of information about hardware and software constituted a moderate barrier in the Phoenix Center. Most information is obtained through publisher catalogs, journals (e.g., T.H.E. Journal, Electronic Learning), and association (e.g., AEDS, ICCE) publications. Hardware information is usually supplied through vendors; during the site visit the local IBM branch office conducted a briefing on IBM configurations which could be used to replace the BTI 5000 MIS. Center staff have been able to keep abreast of related developments by; (a) serving as software evaluators for the Arizona Department of Education, which provides them access to the software library maintained at the department; and (b) actively participating on the technology advisory committees for local school districts. The staff expressed a need for evaluations of commercially available software, alternative network configurations, and instructional management systems which could be used in Center operations.

Factors Contributing to Success

Factors which have contributed to success in Phoenix are both similar and different from those contributing to success in other Job Corps centers.

First, Center administration has, over the last decade, been a strong proponent of technology use, both in the MIS and instructional service delivery. In addition to allocation funds for technology, they provided opportunities for Center staff to develop software and gave encouraged staff to participate in national Job Corps research and development projects.

Second, the Phoenix Center administration has received, over time, considerable support from the regional DOL office. The funds approval process for hardware and software purchases, based on mutual trust, has been very responsive and positive. Indeed, the regional office has discouraged retrenchment of computer-based activities on several occasions when tight budget considerations were uppermost in the minds of Center staff and the national office. It has encouraged the Center to develop a reading instructional management system, similar to that used in math, and has provided, on numerous occasions, constructive criticism designed to improve the effective use of technology in the Center.

Third, the Center has received equipment for little or no cost and has otherwise benefited from its participation in special projects. For example, the original PLATO program, still used in the Center laboratory, was acquired through participation in the EIE project; the BTI MIS was acquired for participation in a subsequent phase of that project. The Center purchased its Apple hardware under an Arizona Department of Education state-wide contract arrangement, which was less expensive than the GSA schedule schedule price. In January 1988, Corpsmembers will have free access to the relatively expensive PALS program. The original Commodore 64 equipment was purchased under a special education discount arrangement from Commodore. While Center staff agree that the Center would likely have purchased hardware through "regular channels", the opportunities for free or discounted equipment certainly prompted their initial decisions to develop technology.

Fourth, a number of staff considerations also contributed to the success of the program. Staff quality and stability have played an important role. They are dedicated to serving at-risk youth through the use of technology. Most have been with the Phoenix Center for between ten and 19 years and have developed the necessary expertise. Most of the staff have been motivated to train themselves to operate the MIS and instructional programs. Indicative of this expertise is the fact that Phoenix staff were used extensively in training several staff who participated in the national CAI evaluation project at other sites.

Fifth, the concept of using computers in a laboratory configuration (where

Corpsmembers go to a separate facility) is somewhat different from the Gary Center, which uses computers in occupational training areas. In addition to providing greater control over the use of computer, the laboratory has provided increased opportunities to serve students from all areas based on their needs. The scheduling packages for TABE administration and PLATO test reviews, developed by Center staff, can organize student use of the computers, focusing on specific needs as they are identified in the occupational training areas and so ensures more uniform implementation of reading and math instruction when compared to decentralized computer use in occupational areas. Moreover, the operation of the laboratory can rely on self-trained and highly motivated instructional Center staff (thus minimizing the need to overcome staff resistance). On the other hand, Center staff acknowledge that the lab concept does not enhance the integration of reading and math skills into occupational training areas and has often been cited as "problematic" by DOL review teams. However, they argue convincingly that the advantages of the lab concept outweigh its limitations.

Closing Comment

The Center's education staff has taken advantage of many opportunities some of which resulted in some minor problems which were, however, less serious than those at the Gary Center. They would like to have had additional technology opportunities, such as the development of a reading instructional management system.

For other JTPA program staff considering replication of the Phoenix model, consideration should be given to both the technology and the concepts followed in Phoenix. Conceptually, a number of important procedures were followed in establishing and operating a computer math and reading lab designed to facilitate occupational training, including:

- providing opportunities for self-training, as staff perceived the need;
- the development of instructional programs to interface with the general MIS, which, in turn, ensured effective communication and coordination between the computer lab staff and individual counselors and occupational instructors; and
- increased use of MIS student data for monitoring participant progress and evaluation of staff and program components.

Several of the technology applications offer high replication potential. First, the Speed Check program, which is owned by the developer, could be used in other programs with access to Commodore 64 equipment. Because the Speed Check program is only used periodically, staff believe that inexpensive hardware, such as Commodore 64, is appropriate, rather than converting to other operating systems. On the other hand, the Math Management System, currently on the BTI 5000, would very likely have to be converted to the operational environments available in other

JTPA programs. An MS-DOS version is likely to become available over time. CAI lessons developed for the BTI system also require some conversion.

For a variety of reasons, including the relatively high cost of maintenance and repair, the PLATO system is not being used as extensively as it has been used in the past and is generally limited to test reviews and for Level 1 reading instruction, particularly with LEP populations. Like Gary, Teledyne is currently exploring the feasibility of obtaining access to the PLATO lessons through the satellite-based NovaNet system, associated with CERL at the University of Illinois.

PATTERNS ACROSS EXEMPLARY TECHNOLOGY-USING PROGRAMS

The case studies of exemplary technology-using programs support most preliminary findings on the barriers to technology use and the policy options previously identified by the Expert Panel and knowledgeable JPTA officials. The findings also confirmed a number of hypotheses generated prior to the site visits, as well as some of the factors contributing to program success and effective use of technology. Below we summarize some of the major findings.

Hypotheses

Champions

One of the important hypotheses to be tested was: "The initial impetus to use computers and related technology came from an advocate who championed the idea both initially and then through the implementation process". One or more champions were found in virtually every site, although the nature of the advocate and his/her role differed somewhat. At the two Job Corps centers, champions existed at both the operational level (e.g., education or computer lab) and at the administrative level. In two of the three Title II programs, champions who advocated technology use were in key positions within the service provider. In the remaining Title II site, technology advocates could be found within the PIC and the service provider, with each playing different roles (e.g., supporting the provider, raising funds from additional sources, generating awareness) in a complementary manner. In all sites, at least one champion had computer-related expertise or access to individuals with such expertise. While technology use was risky in each site and multiple barriers had to be overcome, champions minimized risks and obstacles by: (a) obtaining initial funding or loan equipment from non-JPTA funding sources, vendors, or partnerships which provided in-kind (often hardware) support; (b) generating a sense of ownership on the part of technology-using staff and/or PIC directors; (c) participating in national pilot demonstrations which provided free equipment; and/or (d) tying technology-using programs to state policies and state leadership. A corollary to this finding is that the JTPA system currently does not place priority on the use of technology. Neither does it provide necessary financial assistance (e.g., initial capital investment) or have an infrastructure for supporting technology implementation. The barriers which occurred at most sites were overcome primarily by the champion and the role he or she played.

Policy-Level Support

Another hypothesis was that priority support at the policy level for technology use existed initially or was generated over time. In the vast majority of cases, policy support at the PIC or regional Job Corps office contributed to initial and continued use of technology. In at least one site, a change in leadership is having an impact upon the direction of the program, although technology use within the program will most likely continue at current or expanded levels.

Performance Incentive

Another hypothesis was that a program design with stated goals, performance-based objectives, and major operational procedures created unique opportunities for technology as a critical component of the total delivery system. In both Job Corps' centers, the national Job Corps math and reading program designs included individualized, self-paced instruction which is ideally suited for supplemental CAI. They also generated a need for instructional management systems. In the Title II programs, agreements between PIC's and service providers were competency-based requiring open entry/exit, thereby creating a need for programs (such as the CCP) and related CMI-CAI systems, which are not only self-paced, but also student-directed. The program design developed in South Carolina encouraged the development and use of an instructional management system which would allow for a variety of instructional software packages to be used in a systematic manner which would focus on the state's basic skills assessment program. In Milwaukee, the service providers' overall program design to develop competencies among various LEP and minority participants, on an open-exit/entry basis, created a need for a multimedia configuration using both videodisc and microcomputer-based networks.

Staff Development/Support

Another hypothesis postulated that appropriate levels of staff development and ongoing support were provided throughout the implementation process. Such support was provided by a hardware vendors' providers' national offices, training subcontractors, and Job Corps center staff. Most sites provided periodic in-service training. One site relied heavily on staff self-training and peer tutoring when perceived needs arose. Extensive follow-up support has been provided by vendors or subcontractors in all Title II programs, while, in Job Corps centers, a lack of vendor support for "obsolete" equipment has made it necessary for center staff to provide this support. In at least one case, this has become a serious problem.

Effective Integration

As hypothesized, exemplary use of technology occurs when it is effectively integrated into acceptable procedures, program designs, and curriculum objectives. The heart of the CCP program is the taxonomy of lessons correlated with competencies which, in turn, are mapped to instructional materials, including software. In at least one of the IBM sites, IBM network software has been mapped to the CCP competencies. In South Carolina, extensive staff time and resources were initially allocated to the identification of more than 800 commercially available software packages, which were then correlated to the basic skills objectives of the state, as reflected in the BSAP assessment instrument. The instructional management systems developed by the two Job Corps center's staff rely on CAI lessons, which are integrated into the overall Job Corps management information systems used in the two sites. One of the Milwaukee service providers has developed an interface between the instructional management and an overall MIS which could be used by other centers operated by the national group.

Virtually all of the instructional staff in the Title II programs were certified not only by the service provider's national office, but also by the SEA. In other instances, the instructional programs were certified by the state or the local school district with whom the program is being conducted.

Other Findings

Funding

In the study's findings, the majority of PICs and service providers indicated that funding levels and the unit cost standards were not sufficient to warrant significant investments in technology unless: (a) non-JTPA sources of funds could be generated to cover the shortfall for initial investment; and (b) funding certainty and stability were probable. In virtually all of the exemplary sites, multiple sources of funding were used to capitalize the program initially or service providers were successful in obtaining equipment at little or no cost under vendor partnership programs or other arrangements. The Ford Foundation appears to have been an important source of funding for all of the Title II programs; several service providers are likely to be soliciting new funding from the Ford Foundation and other sources in the near future as they plan to upgrade and/or expand their programs.

Upgrading Technoloyg

Virtually all sites are in the process of modifying or expanding their technology configurations because:

> Certain configurations (particularly in the Job Corps centers) are becoming obsolete; maintenance and repair costs are increasingly becoming a major problem. One of the problems confronting the innovator is the risk he or she takes when free equipment is made available and/or the hardware which is selected is no longer supported by the original vendor. However, as program staff noted, the advantages of such unique opportunities often offset the disadvantages.
>
> Staff at the SDA-level sites are increasingly focused on those participants most "at risk" and hope to take advantage of promising technologies. For example, computer-assisted instruction was felt to be

most effective with LEP students in the Job Corps center sites; three Title II program sites are experimenting or planning to experiment with videodisc technology, particularly for participants with lower reading capabilities, and/or LEP participants.

In the preliminary findings, increased use of computers interfaced with scanning equipment was noted. In most of the sites, such equipment is currently being used and, through the development of software programs by site staff, more extensive use can be expected in the future in such areas as: (a) entering participant data; (b) scoring screening tests; and (c) scoring mastery tests and prescribing lessons.

Information Needs

Program staff also confirmed the need for objective information about pilot program results, software evaluations, and related activities which would assist them in planning their hardware and software configurations. From the nature of questions posed by site staff during site visits, as well as their direct statements, it is also apparent that there is a need for technical assistance for SDAs and service providers in the area of technology use. While service providers indicated that their national corporate offices or "partners" provided excellent technical assistance and training, they also felt that the availability of such assistance was limited.

Many site officials believed that their informational needs would increase in the immediate future. In two sites, travel budgets for staff to attend national or regional conferences were being cut back. Several SDA staff felt that they would increasingly have to rely on service providers, hardware vendors, and local affiliates of national organizations for information about commercially available software.

Future Needs

Even though site staff had different technology configurations and focused upon somewhat different populations, there appeared to be consensus across sites regarding future technology needs. Staff who use the CCP system felt a need for improvement in such areas as networking work stations and developing appropriate interfaces between the CCP management system and other network management systems. Across sites, staff felt the need for additional supplemental materials, including CAI programs for use in GED programs(primarily as a result of the recent changes in the GED test) and for LEP populations. Virtually all staff currently without instructional management systems and networks believed a substantial need for such systems. This was particularly evident at the Job Corps, thus confirming the recent survey finding that over 70 percent of Job Corps center educational staff felt the the development and/or adaptation of an instructional management system which could be used with the Job Corps math and reading programs was the highest priority need across the country.

And finally, across sites, staff indicated that computer-based instructional management systems were making significant contributions to overall program success. All staff agreed that individualized, self-paced, student-directed instruction -- with built-in participant incentives -- is most effective with at-risk youth, particularly LEP populations, when supplemented with CAI lessons and a computer-based,diagnostic/prescriptive, student monitoring capability. They also felt that a competency-based curriculum which is modular in nature, with extensive mastery testing, is not only educationally sound, but also extremely motivational for this population.

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APPENDIX 1

LISTS OF SITE CONTACTS

LIST OF INDIVIDUALS INTERVIEWED AUSTIN/TRAVIS COUNTY, TEXAS

December 1987

State Representative Gonzalo Barrientos
Penny Brimley
Gerald Briney, IBM
Bill Demestihas, Exec. Dir., Private Industry Council
Gustavo Garcia, Sr., Attorney
Dr. Robert Glover, Center for Human Resources
Richard Haplin, American Institute for Learning
Paul Hilgers, Administrator for Cong. Pickle
Larry E. Jenkins, American Institute for Learning
Irma Novoa, Johnston High School
Arnold Rosenfeld, Austin American-Statesman
Tina Tabler
Sondra Whitlow
Leroy Wormley, Jr., IBM
Dick Young, Dick Young Productions

LIST OF INDIVIDUALS INTERVIEWED SOUTH CAROLINA GOVERNOR'S REMEDIATION INITIATIVE

December 1987

Governor's Office - Executive Office of Policy and Programs

Marion Parrish, Education Division

Governor's Office - Division of Employment and Training

Jessie Byrd

Ishmael Holly

Janet Lockhart

Northwestern High

Susie Hanners, Reading Teacher

Earl Lovelace, Principal

Judy Tarleton, Math Teacher

Sumter Area Technical College

Marjorie McDonald

Don Rogers

Anna Strange

Winthrop College

James F. Fouche, PhD, Dean

Ann Maletic

John Rumford

Other G.R.I. Staff

Chris Berardi

Jennifer Helsel

Sovannia Patton

Telephone Interview

Sandy MacCaskill, former director

LIST OF INDIVIDUALS INTERVIEWED GARY JOB CORPS CENTER

December 1987

Harriet Caldwell, GED Instructor
Jonell Cisneros, Assistant MMIS Analyst
Danielle Davila, Data Entry Instructor
Charles Harris, Director of Computer Learning Center
Mary Livers, Director of Education and Training
Idella Minor, Data Entry Instructor
Linda Pruitt, Graded Reading Instructor
Bobby Sanford, GED Instructor
Doug Sheedy, Graded Reading Instructor
Harry Stewart, MIS Analyst
Ted Turman, Assistand Director
Al Wiesen, Texas Education Foundation

LIST OF INDIVIDUALS INTERVIEWED PHOENIX JOB CORPS CENTER

December 1987

Pat Banks-Huckleby, Instructor, Electronics Assembly
Jerry Carlton, Assistant Center Director
Linda Cunningham, Instructor, Retail Sales
Leroy Mobley, Instructor, Special Programs; Computer Lab Director
Don Screes, Center Director
Dale Volz, Manager, Basic Education Program

LIST OF PRINCIPLE INDIVIDUALS INTERVIEWED MILWAUKEE, WISCONSIN

December 1987

Lawrence Jankowski, Director, Milwaukee County,
Executive Office for Economic and Resource Development

Miguel Berry, Director, SER Jobs for Progress

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